

WHITE PAPER

EXAMINING THE ROLE OF TEACHER EVALUATION IN STUDENT ACHIEVEMENT

CONTEMPORARY RESEARCH BASE FOR THE
MARZANO CAUSAL TEACHER EVALUATION MODEL



OUR MISSION

Learning Sciences Marzano Center promotes excellence in public education by providing and developing next-generation teacher and leadership evaluation tools and training. Built on a foundation of expert research into best practices in partnership with national researcher and author Dr. Robert Marzano, the Marzano Center identifies, develops, and disseminates cutting-edge resources in educational best practices. Our goal is to support teachers to be highly effective, lifelong learners, and in doing so, to significantly impact student growth and achievement over time.

Individual raters can identify which of the 41 strategies are being employed by the observer with a relatively high degree of accuracy.

The more strategies teachers used and the better they executed them, the greater their students' achievement in terms of both status and growth.

The results of those studies strongly correlated the Marzano Causal Teacher Evaluation Model to positive results in raising student state test scores.

Teachers perceive that the Marzano Causal Teacher Evaluation Model is helping them develop as teachers.

All correlations for Domain 1 elements were positive, with some as high as .70. The effectiveness of the interactive whiteboards was greatly enhanced by the use of Domain 1 strategies.

Not only was teacher's overall score on the model correlated with student status and growth, but so were the various design questions.

Correlations are associated with a 31 percentile point increase in student achievement.

On average, the strategies used in the independent studies represent a gain of 16 percentile points over what would be expected if teachers did not use the instructional strategies.

Rater agreement was considerably larger than the inter-rater reliabilities reported in the MET study for a single rater scoring a single lesson.

Average predicted two-rater reliability across the elements is .75.

When teachers' one-to-one interactions with students were analyzed, Design Questions 6-9 showed a relatively strong positive relationship with students' achievement status and growth.

THE ROLE OF TEACHER EVALUATION IN RAISING STUDENT ACHIEVEMENT

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INTRODUCTION

States and school districts across the nation are responding to sweeping state legislative education reform proposals. The momentum that began with national Race to the Top initiatives in 2009 shows no sign of flagging and there seems to be little doubt that teacher and leadership evaluation will change dramatically in the coming years. Recent multi-year studies from the Bill and Melinda Gates Foundation; McKinsey & Company's 2010 paper, *Closing the Talent Gap* (Auguste, Kihn, Miller, 2010); the Center on Education Policy's paper on the status of state K-12 education funding and reforms (CEP, 2012); state education policy think tank reports from Nebraska's Platte Institute (Alger, 2012); and others dovetail in their recommendations for better evaluative measurement systems for teachers and principals, higher accountability, and an absolute focus on improved educator effectiveness and student learning.

Next-generation models, grounded in sound research, will emphasize teacher growth and development.

The most valuable evaluation model will not only meet state legislative requirements, it must produce gains in student learning. The model must evaluate teachers and, just as importantly, improve their classroom performance over time. Next-generation models, grounded in sound research, will emphasize teacher growth and development. As teachers' classroom instructional practice improves, districts should see a corresponding improvement, measurable and consistent, in student achievement.

CURRENT TRENDS IN TEACHER EVALUATIONS: BUILDING EXPERTISE

The Measures of Effective Teaching (MET) Report issued in January 2012 by the Bill and Melinda Gates Foundation spelled out the challenge of improving K-12 education in the next decade. When it comes to teacher evaluation models, adopting a rigorous and fair system for evaluating teachers for the purposes of promotion, retention, and hiring is an important area of focus. But such a system is not enough to ensure gains in student learning. The next generation of evaluation models must be designed to improve the quality of teaching over time.

“We are entering a new era of teacher evaluations. The expectation is that all teachers can increase their expertise from year to year and thereby produce gains in student achievement, with a powerful cumulative effect.”

Dr. Robert Marzano

In *Gathering Feedback for Teaching: Combining High Quality Observations with Student Surveys and Achievement Gains* (Bill and Melinda Gates Foundation, 2012), MET project authors state very clearly that the quality of instruction matters. “Ideally,” the authors note, “an observation instrument should create a common vocabulary for pursuing a shared vision of effective instruction” (p. 4). Again and again the authors return to this central point: “Ultimately, the goal is to use classroom observations to help teachers improve student outcomes” (p. 6). The authors note that untargeted professional development – in other words, generalized programs not based on individual assessments of teachers’ strengths and weaknesses – have little effect on teacher growth or student achievement. “The true promise of classroom observations is the potential to *identify strengths and address specific weaknesses in teachers’ practice*,” MET authors conclude (p. 16, our italics). Recent studies (Taylor and Tyler, 2011; Allen et al., 2011) have confirmed the value of individualized coaching and targeted feedback.

Thus, the ideal evaluation model is a professional development model: it will rely on frequent observations across different lessons and sections of students; it will provide ample opportunities for focused feedback; and it will build teacher expertise over time.

THE TEST IS IN THE CLASSROOM

Teaching is an enormously complex task. The skilled teacher utilizes an artful combination of practical experience, judgment, passion, teaching strategies, and the ability to adapt to differing student learning needs. Even more, any committed teacher can become a better teacher over time with focused practice in research-based strategies. Thus, a highly effective teacher evaluation model must:

- » Recognize and accurately reflect the complexity of the teaching/learning process
- » Give teachers and administrators specific instructional tools to organize their pedagogical goals and attain mastery
- » Rest on a foundation of research conducted in the real-world environment of working classrooms
- » Be flexible and robust enough to accommodate evolving state standards and directives
- » Effect measurable increases in student achievement and student growth over time

In short, a robust evaluation model honors the complexity of teaching by recognizing that teachers utilize different types of lessons for different purposes. It will advance teachers’ skills toward a goal of mastery and measurably impact student achievement. More specifically, a model’s individual elements, when used strategically by a teacher in the classroom, should quantifiably improve student learning.

“The true promise of classroom observations is the potential to identify strengths and address specific weaknesses in teachers’ practice.”

Gathering Feedback for Teaching;
MET Project Report, 2012

THE IMPORTANCE OF TEACHER PERCEPTIONS

School administrators are well aware that no evaluation and development model, however solidly grounded in research, will thrive without teachers' support and enthusiasm. Teacher buy-in is crucial for the success of any model. Thus, examination of teacher perceptions regarding evaluation models provides unique insights regarding the impact on teaching practices. How have teachers used the model in their classrooms? How does the model inform the teacher's practice? What's working well? What are the challenges? What professional development are teachers receiving and how has it helped or hindered their understanding and use of the model? How is the model being phased in so that learning new strategies, scales, and technologies are useful and positive experiences?

Gathering anecdotal answers to such questions serves two purposes: it reveals what's working and what isn't, but just as importantly, it encourages teachers to reflect upon, and take responsibility for, their own development as professionals.

Teachers perceive that the Marzano Causal Teacher Evaluation Model is helping them develop as teachers.

In 2011, Learning Sciences International conducted video surveys in schools in Leon County, Florida, where the Marzano Causal Teacher Evaluation Model was in the first year of implementation. Learning Sciences asked teachers, principals, and administrators who had only a few months of experience using the model in their classrooms a standard set of questions. In particular, surveyors wanted to know: Do teachers perceive that the Marzano Teacher Evaluation Model is helping them develop as teachers? In what ways is the model making them more effective in the classroom? Are the strategies working and if so, how do they know it?

“Principal collaboration, teacher collaboration, all of that is happening so much more than it ever has before. Teachers, principals, and administrators are talking the same language through all kinds of communication [and] building a common understanding of what really good classroom instruction looks like.”

Jo Marie Olk
Director of Professional Learning and Instructional Development
Leon County Schools, Tallahassee, Florida

“The lines of communication between me and my teachers have been opened to a point where, for the first time, teachers are talking about improving student instruction. They're talking about it in my office. They're talking about it with their colleagues in the hallways. This model has us talking; that's been incredibly powerful.”

Shelly Bell
Principal
Cobb Middle School, Tallahassee, Florida

“I've been teaching for 32 years and I have seen [evaluation] systems come and go. This is specific feedback given to me to help me become a better teacher. And it's great. I really like that I know what they're going to be looking for. They come in, they notice other things as well, but they can give me feedback on what I'm working on and I don't feel threatened by it.”

Frances Homme
Teacher
Roberts Elementary School, Tallahassee, Florida

“Marzano's The Art and Science of Teaching [the Marzano Teacher Evaluation Model] has changed my practices this year. I'm always trying to figure out what I can do better. When the students don't do well, you can't look at them first. You have to look at yourself first. And Marzano says basically the same thing. Student performance is primarily about the teacher. You can put 15 or 20 or 30 students in that classroom and it's the teacher's responsibility to be able to influence them and impact them with the rigorous curriculum and engage them. And Marzano does speak to that.”

Joseph Bowen
Teacher
Cobb Middle School, Tallahassee, Florida

VALIDATION RESEARCH CONDUCTED IN CLASSROOMS

In analyzing various evaluation models, educational leaders are well advised to seek out the research data that supports the model as enhancing teacher effectiveness and student achievement. Based on a review of the literature, it appears that the Marzano Causal Teacher Evaluation Model is the only evaluation model to have been tested by extensive action research studies in the field. No other model has been subjected to a wide array of experimental/control and correlation studies. These studies were designed to test the effectiveness not only of the model as a whole, but the effectiveness of specific pedagogical strategies utilized by individual teachers.

At present, the Marzano Teacher Evaluation Model is used in whole or in part in 50 states, Canada, Australia, and in countries in Europe, Asia, and South America.

Five hundred teachers in 87 schools embedded in 26 districts have participated in studies to examine the efficacy of specific strategies in their classrooms.

The research has yielded more than 1,000 effect sizes for specific strategies associated with Domain 1 of the Marzano Teacher Evaluation Model. A synthesis of more than 300 studies indicates that on average, the strategies addressed were associated with an effect size of .42, with some studies reporting effect sizes of 2.0 and higher. An effect size of .42 is associated with a 16 percentile point gain in student achievement (Haystead and Marzano, 2009). Other studies have correlated those same specific strategies, used by individual teachers, with student achievement growth as measured by state test scores. Finally, new research conducted in 2012 by Learning Sciences International and the Marzano Research Laboratory has examined the reliability of classroom observations using the Marzano Teacher Evaluation Model.

On average, when teachers used the classroom strategies and behaviors in the Marzano Causal Teacher Evaluation Model, typical student achievement increased by 16 percentile points.

This report summarizes four recent studies: *What Works in Oklahoma Schools* (Marzano Research Laboratory, 2011), *The Adams 50 Instructional Model Study* (Marzano Research Laboratory, 2011), *Report on Professional Development* (Marzano Research Laboratory, 2010), and *Evaluation Study of the Effects of Promethean ActivClassroom on Student Achievement* (Marzano Research Laboratory, 2009), each of which examined the Marzano Teacher Evaluation Model in working classrooms. These four studies all demonstrated positive correlations between the Marzano Teacher Evaluation Model and student learning, with the first three focusing on state test scores. Additionally, this report summarizes the meta-analytic synthesis of more than 300 experimental/control studies conducted by practicing teachers in the classroom. Finally, this report details a series of studies on the reliability of observations using the Marzano Teacher Evaluation Model.

“The Marzano Causal Teacher Evaluation Model provides teachers with specific feedback to improve the quality of their teaching; we know that is the single most important factor when it comes to student achievement. The whole system is really focused on teacher improvement and development.”

Dr. Brian Staples
Principal

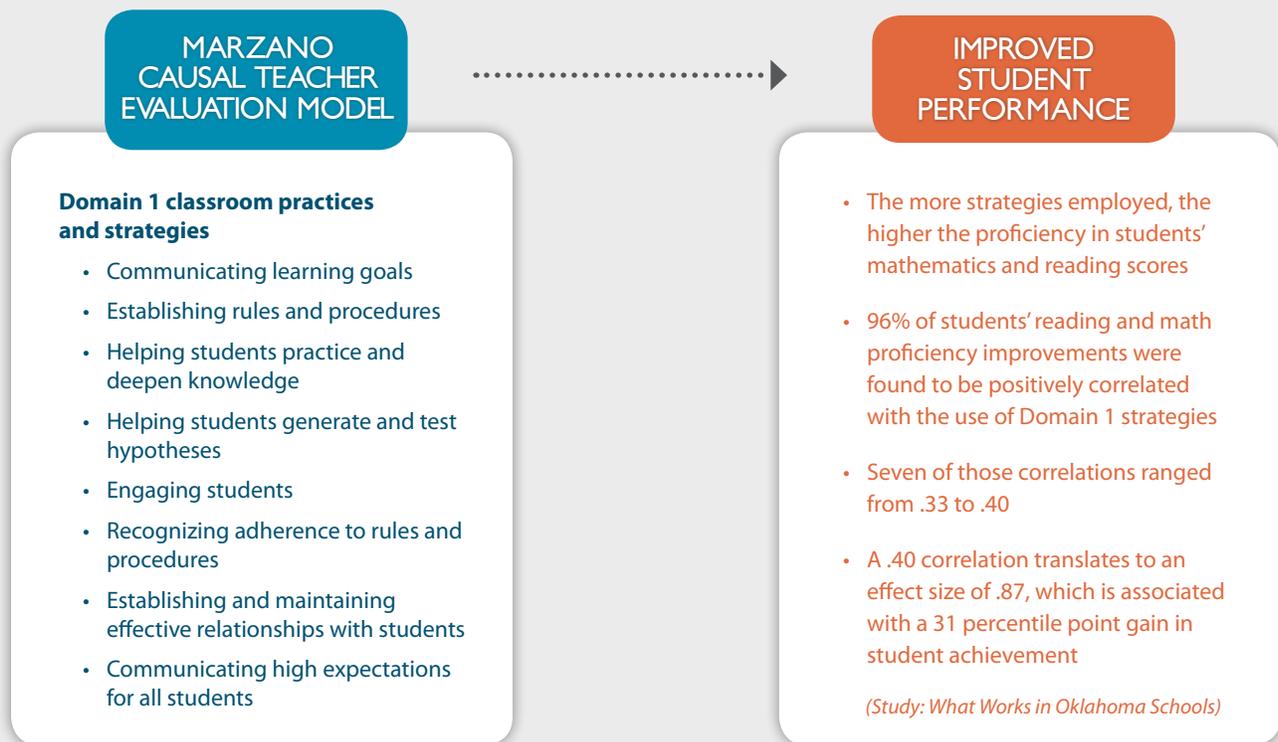
Douglass Mid-High School, Oklahoma City, Oklahoma

HOW IT WORKS: AN EFFECTIVE MODEL EMBRACES COMPLEXITY

Figure 1 | Teachers have the greatest impact on student achievement

The Marzano Causal Teacher Evaluation Model is founded on three distinct premises:

1. The purpose of a teacher evaluation model is to measure teacher effectiveness and to advance teacher performance over time.
2. Effective teaching is the leading indicator for improving student performance.
3. The most effective evaluation model will show measurable correlations between the model's individual strategies and teacher development.



THE RESEARCH: FOUR STUDIES DOCUMENT SUBSTANTIAL INCREASES IN STUDENT LEARNING

The Marzano Causal Teacher Evaluation Model was initially based on more than 5,000 studies spanning five decades. These studies have been chronicled and catalogued in books widely disseminated to teachers and principals in the United States; more than 2 million copies have been purchased by K-12 educators. They include *What Works in Schools* (Marzano, 2003), *Classroom Instruction that Works* (Marzano, Pickering, & Pollock, 2001), *Classroom Management that Works* (Marzano, Pickering, & Marzano, 2003), *Classroom Assessment and Grading that Work* (Marzano, 2006), *The Art and Science of Teaching* (Marzano, 2007), and *Effective Supervision: Supporting the Art and Science of Teaching* (Marzano, Frontier, & Livingston, 2011). Each of these works was generated from a synthesis of research and theory. Thus, the Marzano Teacher Evaluation Model is an aggregation of the research on specific elements shown to correlate with student academic achievement. In addition to the research on which it was originally based, the Marzano Teacher Evaluation Model has undergone continuous study in the field since its inception.

CASE 1 » A CORRELATIONAL STUDY: WHAT WORKS IN OKLAHOMA SCHOOLS

A MEASURABLE RELATIONSHIP BETWEEN CLASSROOM STRATEGIES AND STUDENT IMPROVEMENT

In 2009-2010, in an effort to provide more effective feedback to Oklahoma schools, the Oklahoma State Department of Education (OSDE) commissioned a study of the school-level and classroom-level variables important to achievement in Oklahoma schools. The study involved 61 schools, 1,117 teachers, and more than 13,000 K-12 students (Marzano Research Laboratory, 2011).

“We are in our second year of using the Marzano [Causal Teacher Evaluation Model] and iObservation for the supervision of instruction. We have found that Marzano’s research base has given us a good foundation for establishing a common language about effective instruction.”

Shirley Simmons, Ph.D.
Director of Staff Development and Student Achievement
Norman Public Schools, Norman, Oklahoma

Using a detailed set of student, teacher, administrator, and parent surveys on a wide array of classroom strategies and behaviors, the study compared 33 “improvement” and 28 “non-improvement” schools at the elementary, middle school, and high school levels to determine if use of individual Marzano Causal Teacher Evaluation Model classroom strategies had a measurable impact on student learning.

As stated by the OSDE, improvement schools were those that did not make Adequate Yearly Progress for two consecutive years in the same subject or performance target. Non-improvement schools were those

that did make Adequate Yearly Progress. Scores from all assessments in the Oklahoma School Testing Program for Mathematics and Reading/Language Arts were included in the performance measure for math and reading. The goal of every improvement school was to move out of this category to a non-improvement status.

ON-SITE OBSERVATIONS

Phase I of the study focused on school-level variables. Phase II of the three-part study focused on classroom variables using data from on-site classroom and video-recorded observations. (Phase III, which dealt with Action Steps, is not relevant to this discussion). Teacher data was anonymous and video recordings of teachers were viewed only by researchers involved in the study. During on-site visits at the 61 school sites, researchers conducted classroom observations in 10 randomly chosen classrooms per school. For these observations, researchers used an observational protocol based on the Marzano Teacher Evaluation Model to obtain data. In this observational protocol, 41 specific categories of teacher behavior are listed within three general segments (Fig. 2) and

Correlations are associated with a 31 percentile point increase in student achievement.

nine design questions (see Appendix A, Domain 1). Evaluators used a five-point scale (Fig. 3) to evaluate teacher performance for each of the 41 key strategies within the nine design questions.



Figure 2 | Fundamental Lesson Segments (Marzano, 2007)

Innovating (I)	Applying (A)	Developing (D)	Beginning (B)	Not Using (NU)
Adapts and creates new strategies for unique student needs and situations	Uses the strategy and monitors student behavior to determine if strategy is having the desired effect	Uses the strategy but in a mechanistic way	Uses the strategy but incorrectly or parts are missing	Strategy was called for but not exhibited

Figure 3 | Scale for the Observational Protocol for Effective Instruction (Marzano, 2007)

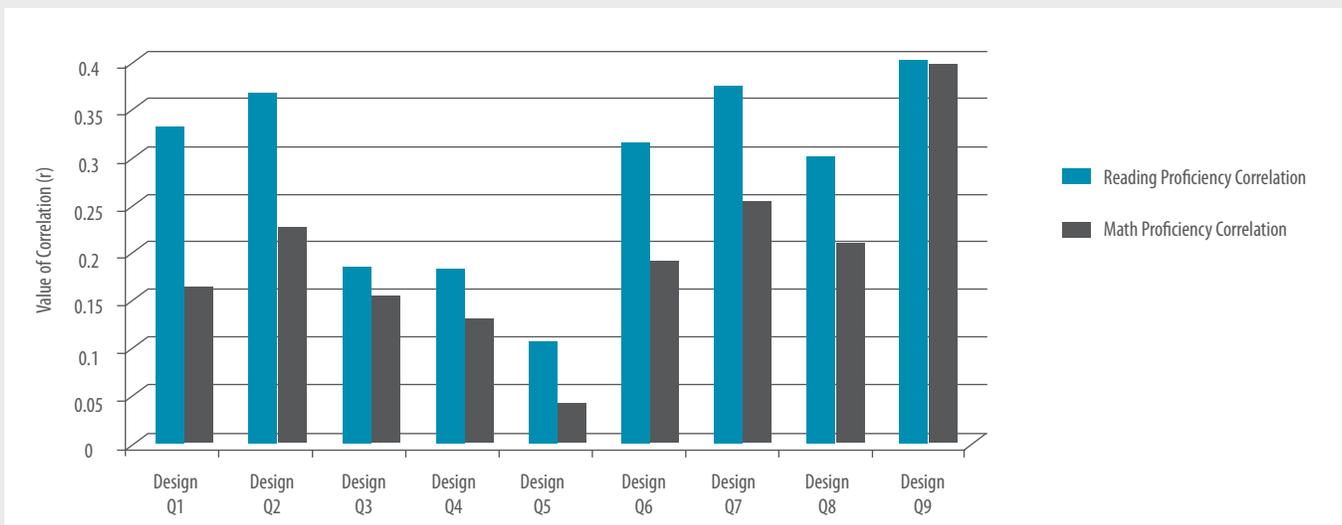


Figure 4 | Math and Reading Correlations with 9 Design Questions (*What Works in Oklahoma Schools*, 2010)

THE RESULTS: POSITIVE GAINS IN STUDENT ACHIEVEMENT

Using state mathematics and reading test data, 96 percent of the 82 correlations (41 correlations for reading, 41 correlations for math) were found to be positive, with some correlations as high as .40 and greater. A .40 correlation translates to an effect size (i.e., standardized mean difference) of .87, which is associated with a 31 percentile point gain in student achievement (Fig. 4).

CASE 2 » THE ADAMS 50 INSTRUCTIONAL MODEL STUDY

INDIVIDUAL TEACHER EFFECTIVENESS LINKED TO STUDENT GROWTH

During the 2010-2011 school year, Adams County School District 50 in Westminster, Colorado, conducted an initiative to create a unique, learner-centered, standards-based model of instruction based on the 41 elements and nine design questions in Domain 1 of the Marzano Causal Teacher Evaluation Model. (See Appendix A, Domain 1.) The study involved 450 teachers and 6,000 students (Marzano Research Laboratory, 2011). The purpose of the project was to develop a model of instruction that is specific to standards-based schooling (SBS) as practiced in Adams County School District 50.

Not only was a teacher's overall score on the model correlated with student status and growth, but so were the various design questions.

PHASE I: DEVELOPING THE MODEL

The first phase involved the development of an initial instructional model specific to Adams County School District 50. During this phase, Adams 50 teachers and administrators were trained in the instructional model, the Art and Science of Teaching, to establish an initial, common way of conceptualizing effective classroom instruction based on 41 strategies and nine design questions.

Researchers worked with a team of Adams 50 educators to adapt the Art and Science of Teaching model to the special requirements of Standards Based Schooling (SBS). An initial Adams 50 Instructional Model was created and distributed in December 2010.

“The other thing we really are focusing on is effective teaching. And our evaluations are now not just perfunctory: they're not just going in, checking off. Really there's a goal there to make every teacher the very best that they can be.”

Jo Marie Olk
Director of Professional Learning and Instructional Development
Leon County Schools, Tallahassee, Florida

PHASE II: VALIDATION STUDY

The validation study was notable in that it focused on the relationship between teacher performance on the nine design questions from Domain 1 of the Marzano Teacher Evaluation Model and student academic achievement and growth as measured by state tests. The first part of the Phase II validation study addressed the effectiveness of the overall model. The second part addressed both how well teachers were implementing individual design questions and how that effectiveness correlated with student achievement.

Researchers used teacher surveys and direct classroom observations via video recordings to determine the extent to which teachers used the Marzano Teacher Evaluation Model and with what level of proficiency. The reliability of scoring of teacher proficiency in the model was computed and reported. Researchers then correlated teacher proficiency scores with 31 different measures of student achievement and student growth using state longitudinal data.

VALIDATION STUDY RESULTS

The overall validity of the Adams 50 Instructional Model was analyzed by examining the correlation between teachers' overall proficiency scores on the model with 31 different measures of student achievement that included Colorado Student Assessment Program status and growth scores and status scores gathered by SCANTRON®. The total score for each teacher was computed as the average score across the 41 elements of the Adams 50 Instructional Model as measured by the teacher survey. Teachers' total scores were then correlated with the 31 measures of student achievement to form a distribution of correlations.

The average correlation between teachers' total scores on the Adams 50 Instructional Model and student achievement was .18, which is significant at the .001 level*. The minimum correlation was .10 (i.e., no correlations were below zero) and the maximum was .29. At face value, these findings would indicate that the more strategies teachers use within the Adams 50 Instructional Model and the better they execute them, the greater their students' achievement in terms of both status and growth. The correlations in this distribution are all positive and range from low to moderate in strength.

CORRELATIONS FOR SPECIFIC DESIGN QUESTIONS

In addition to the relationship between a teacher's overall performance on the model and student achievement, correlations were computed for the nine specific design questions and student achievement.

The relationship between teacher performance on the design questions of the Adams 50 Instructional Model and students' academic achievement and growth was examined in two ways for each design question:

“I think the biggest thing for me was explaining to kids, this is what I expect for you to do, and at the end, this is what I want you to do. Actually stopping and making them responsible for knowing, okay, this is what I did today. This is what I accomplished.”

Mailin Muy
Teacher

Roberts Elementary School, Tallahassee, Florida

“We selected the Marzano Teacher Evaluation Model because it was a continual growth model rather than just mastery, so we could avoid inflated ratings and actually provide useful feedback.”

Wendy Nance
Director of Human Resources
Chandler Unified School District, Arizona

1. Teacher scores from the teacher survey were correlated with the student status and growth scores provided by the district.
2. Teacher scores from the video analyses were correlated with the student status and growth scores provided by the district.

All teacher videos were scored by a single rater blind (i.e., without access to status or growth scores). To establish reliability of scoring for each design question, 10 videos were randomly selected and scored twice by the rater, one week apart. The lowest percentage of agreement (i.e., 70%) was for Design Question 8; the highest percentage of agreement (i.e., 90%) was for Design Question 4.

The more strategies teachers used within the Adams 50 Instructional Model and the better they executed them, the greater their students' achievement in terms of both status and growth.

*In many sciences, based on general research experience, results that are significant at the .01 level are commonly considered statistically significant, and .005 or .001 levels are often considered highly significant.

RESULTS FOR SPECIFIC DESIGN QUESTIONS

Significant correlations ($p < .05$) between design questions and student achievement status and growth were reported for Design Questions 1-5 (average correlations ranged from .15 to .40). Initially, Design Questions 6-9 did not exhibit statistically significant average correlations with student achievement status or growth for the teacher surveys or video analyses. This is not to say that some correlations with individual assessments were not significant. Indeed, Design Question 6 had a significant correlation of .69 with one of the assessments and the teacher score for this question based on the video analysis. Design Question 7 had a significant correlation of .60 with one assessment and the teacher score based on the video analysis. Design Question 8 had a significant correlation of .36 with one assessment and the teacher score based on the teacher survey. Finally, Design Question 9 had a significant correlation of .36 with one assessment and the teacher score based on the video analysis.

Despite relatively high correlations with some of the assessments, each of these design questions also had some negative correlations and some correlations near or equal to zero, rendering the average correlations for these design questions across the different status and growth measures so low as to be nonsignificant.

When teachers' one-to-one interactions with students were analyzed, Design Questions 6-9 showed a relatively strong positive relationship with students' achievement status and growth.

CORRELATIONS FOR ONE-TO-ONE TEACHER/STUDENT INTERACTIONS

To further clarify these findings, subsequent video analyses indicated that teacher interaction with students on these more interpersonal teaching strategies is most commonly manifested in one-to-one interactions with students as opposed to whole-class interactions, particularly within a standards-based system. Correlations between teacher behaviors and student status and growth were then recomputed.

When correlations were recomputed, the study yielded some surprising findings. When teachers' one-to-one interactions with students were analyzed, Design Questions 6-9 showed a relatively strong positive relationship with students' achievement status and growth. The average correlation for Design Questions 6 and 7 was .38; for Design Question 8 the average correlation was .41; and for Design Question 9 the average correlation was .31.

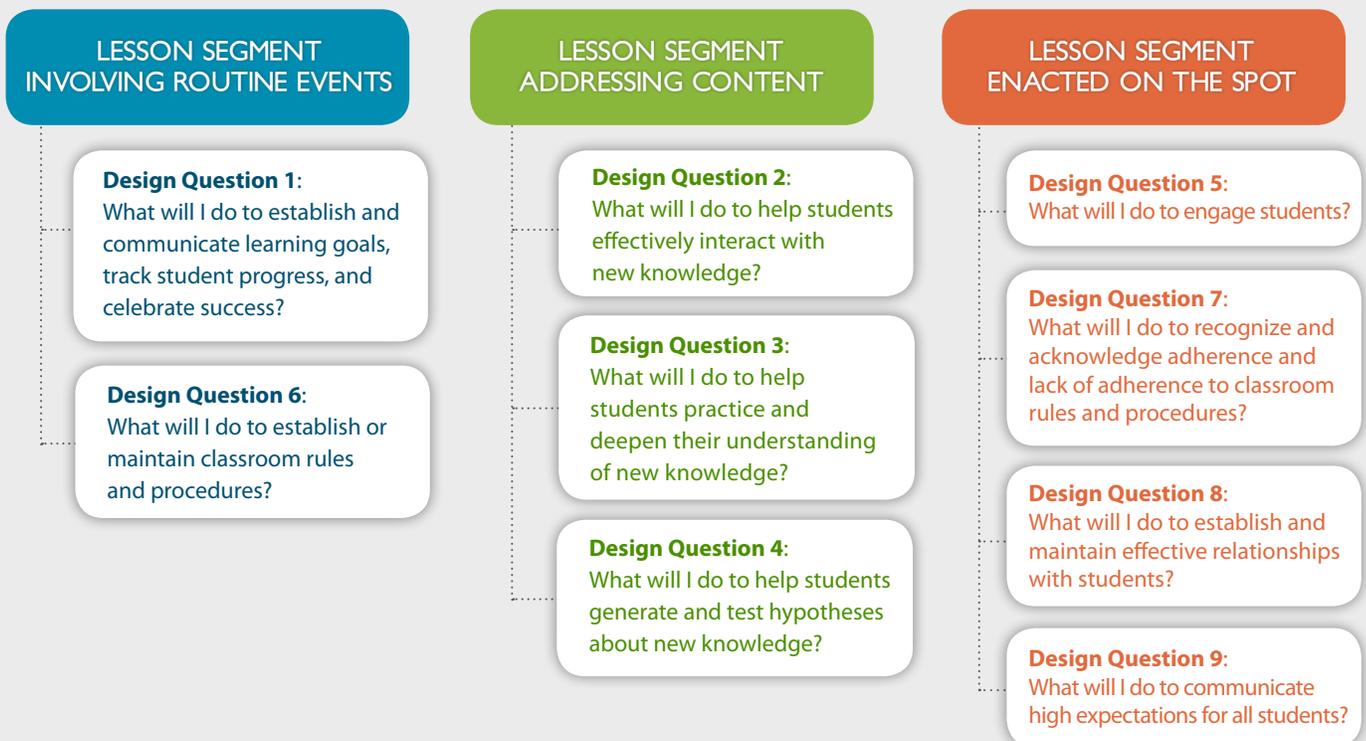


FIGURE 5 | Observational Protocol for Effective Instruction (*The Art and Science of Teaching, 2007*)

CONCLUSION: THE MARZANO CAUSAL TEACHER EVALUATION MODEL VALIDATED IN TERMS OF STUDENT ACADEMIC STATUS

One general conclusion supported by the findings was that the overall Adams 50 Instructional Model is validated in terms of its relationship to student academic status and growth.

As noted before, of particular interest in the findings was that in a standards-based system, Design Questions 6-9 manifest more in a teacher's one-to-one interactions with students than they do in whole-class interactions within the context of the standards-based classroom.

“The Marzano [Teacher Evaluation] Model has changed the way I teach, not only by making me plan very much ahead and making sure my goals and objectives are set and that I have a way of measuring whether or not my students have met those goals and objectives, but really using the rubric has zoned in on my teaching practices.”

Rebecca Shultz
Teacher

Amos P. Godby High School, Tallahassee, Florida

CASE 3 » REPORT ON PROFESSIONAL DEVELOPMENT: 10 TEACHERS ON THREE CRITICAL COMMITMENTS TO SCHOOL REFORM

TEACHERS' USE OF DOMAIN 1 STRATEGIES CORRELATES WITH IMPROVED STATE READING AND MATH SCORES

During the 2009-2010 school year, teachers at Apache Elementary School in Farmington, New Mexico, participated in a series of professional development workshops on Getting Serious about School Reform: Three Critical Commitments (Marzano and Associates, 2008). These three critical commitments represent a serious dedication to reform.

The Three Critical Commitments

Commitment 1: Develop a system of individual student feedback at the district, school, and classroom levels.

Commitment 2: Ensure effective teaching in every classroom using the Marzano Causal Teacher Evaluation Model.

Commitment 3: Build background knowledge for all students.

Data

School administrators provided researchers with data from three sources:

- » 2009 state test data detailing the percentage of students, proficient or advanced, in reading and mathematics for 10 teachers at Apache Elementary School
- » Teachers were asked to take a test regarding their knowledge of the three critical commitments. The test for Commitment #2 (Ensure effective teaching in every classroom) was divided into five sections: Measurement Topics; Marzano Rubric; Marzano Taxonomy; The Art and Science of Teaching; and Six-Step Vocabulary Process. Teachers were placed into four categories based on their overall scores for each section (3.0, 2.5, 2.0, 0-1.5). (Note: Because the fourth category represented a range of scores from 0 to 1.5, 1.5 was used as the score for this category.)
- » Teachers were evaluated regarding their level of implementation (L, M, H-, H, H+, i.e., Low, Medium, High-minus, High, High-plus)

Findings: For the purposes of this discussion, commitment to the Marzano Causal Teacher Evaluation Model is of the most interest. The correlation between implementation of the Marzano Teacher Evaluation Model and the percentage of students scoring proficient or advanced on the state tests was .43 for reading and .71 for mathematics.

CASE 4 » PROMETHEAN ACTIVCLASSROOM STUDY

STUDENT ACHIEVEMENT CORRELATED WITH USE OF INTERACTIVE WHITEBOARDS

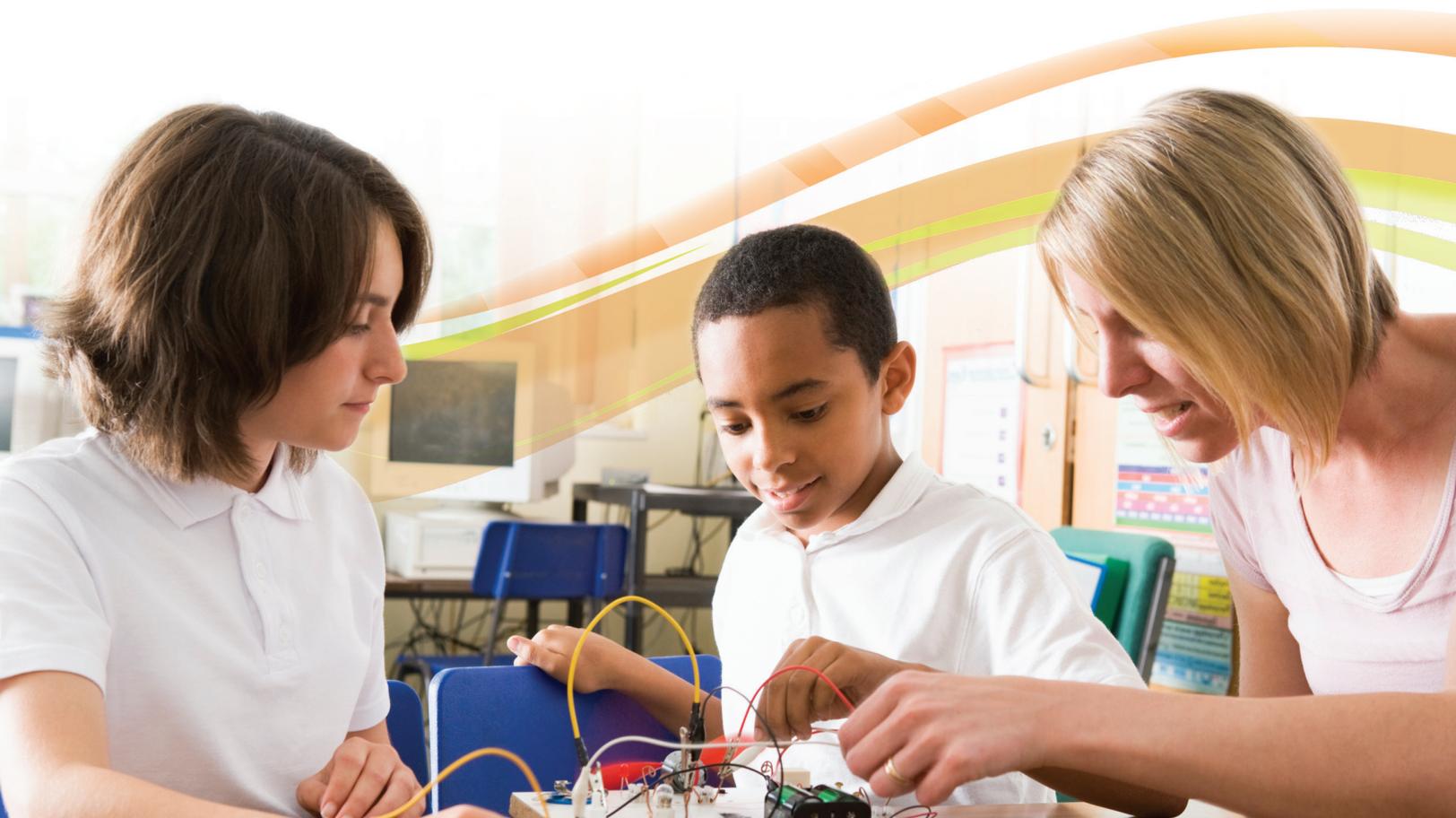
In the 2008-2009 school year and again in 2009-2010, Promethean Ltd. commissioned an evaluation study to determine, in part, the relationship between selected elements from Domain 1 of the Marzano Causal Teacher Evaluation Model and the effects of interactive whiteboards on enhancing student achievement. In all, 131 experimental/control studies were conducted across the spectrum of grade levels, involving 4,913 students and 123 teachers in 73 schools and 36 districts (Marzano, 2010).

The study employed a series of 17 evaluation questions to determine the positive or negative effects of whiteboard use on student achievement. Selected elements of Domain 1 of the Marzano Teacher Evaluation Model were correlated with the effect sizes for use of the interactive whiteboards. These elements included Domain 1 instructional strategies such as the following:

- » Previewing new content
- » Chunking content into digestible bites
- » Scaffolding content
- » Pacing of content
- » Monitoring student progress
- » Student interaction with content
- » Student response rates
- » Classroom management

All correlations for Domain 1 elements were positive, with some as high as .70. The effectiveness of the interactive whiteboards was greatly enhanced by the use of Domain 1 strategies.

The relationship of these strategies to positive or negative effects for the use of the whiteboard was then analyzed. When the results from the first- and second-year evaluation studies were combined, all correlations for Domain 1 elements were positive, with some as high as .70. The results of the study implied that the effectiveness of the interactive whiteboards as used in the 131 studies was greatly enhanced by the use of Domain 1 strategies.



META-ANALYSIS OF EXPERIMENTAL/CONTROL STUDIES CONDUCTED ON ELEMENTS OF THE ART AND SCIENCE OF TEACHING



Figure 6 | Meta-analytic techniques used with different dependent measures

To date, Marzano Research Laboratory has conducted quasi-experimental studies (i.e., experimental/control studies with intact groups) with more than 500 teachers that have yielded more than 1,000 effect sizes. Of these studies, 329 have been synthesized using meta-analytic techniques. These 329 studies involved 38 schools in 14 districts between fall 2004 and spring 2009. Experimental/Control groups were composed of more than 14,000 students. Participating teachers selected two groups of students, both of which were being taught the same unit or set of related lessons. Teachers used a specific instructional strategy taken from Domain 1 of the Marzano Causal Teacher Evaluation Model in the experimental groups. Teachers did not use the strategy in the control groups.

ABOUT RANDOM ASSIGNMENT AS APPLIED TO CLASSROOM EXPERIMENTS

Because it is typically impractical for classroom teachers to make random assignment of students to classes, researchers used the analysis of covariance (ANCOVA) recommended by the Institute for Educational Sciences (IES), the research arm of the U.S. Department of Education. The IES recommends that when random assignment cannot be employed, ANCOVA should be used as a statistical way to control for student differences prior to the intervention, although no statistical adjustment can ever control for differences in groups as well as random assignment. Thus, all studies employed a quasi-experimental design, referred to as a pre-test/post-test non-equivalent groups design. The pretest scores were used as a covariate to partially control for differing levels of background knowledge and skill. These analyses of covariance were employed in all studies.

The dependent variable was students’ knowledge of academic content addressed during a unit of instruction. The independent variable of interest was whether or not students were exposed to an instructional strategy.

The following questions were considered through a meta-analysis of the 329 independent studies:

1. What effect does the utilization of instructional strategies have on students’ achievement regarding the subject matter content taught by their teachers?
2. Does the effect of instructional strategies differ between school levels?
3. Does the effect of instructional strategies differ from strategy to strategy?

Meta-analytic techniques (see Hedges & Olkin, 1985; Lipsey & Wilson, 2001; Cooper, 2009) were used to aggregate the findings from the independent studies.

On average, the strategies used in the independent studies represent a gain of 16 percentile points over what would be expected if teachers did not use the instructional strategies. The results of those studies strongly correlated the Marzano Causal Teacher Evaluation Model to positive results in raising student state test scores.

In general, meta-analytic techniques are used when the results of independent studies on a common topic are combined. For example, assume 25 studies were conducted in various sites on the effects of a specific instructional technique on student achievement. The studies were different in terms of the subject areas that were addressed. Consequently, different assessments of student achievement were used to reflect the different subject areas. This is the classic scenario requiring the use of meta-analytic techniques - independent studies on a common topic (i.e., a common instructional technique) but with different dependent measures.

RESULTS: META-ANALYSIS OF INDEPENDENT STUDIES REVEALS A 16 PERCENTILE POINT GAIN IN STUDENT ACHIEVEMENT

The average effect size for all 329 independent studies was statistically significant ($p < .0001$). When corrected for attenuation, the percentile gain associated with the use of the instructional strategies was 16 ($ES = .42$). On average, then, the strategies used in the independent studies represent a gain of 16 percentile points over what would be expected if teachers did not use the instructional strategies.

(Meta-analysis of Experimental/Control Studies Conducted on Elements of The Art and Science of Teaching, Marzano Research Laboratory, 2009). For the specifics of the data analysis, see the meta-analytic synthesis in Appendix C.

ABOUT META-ANALYSIS

The underlying logic of meta-analysis is that a single study will always contain uncontrolled error, even under the best of circumstances. However, the aggregation of findings across a wide array of studies using meta-analytic statistical techniques can provide a more stable picture of the true nature of the impact of an intervention since the effects of moderator variables can be examined.

Additionally, uncontrolled error in one set of studies will tend to be cancelled out by another set of studies. In short, while inferences from a single or even a few experimental/control studies that do not employ random assignment are fraught with problems, inferences across more than 1,000 effect sizes gleaned from studies in classrooms made by practicing teachers can disclose strong patterns worthy of attention.

FIGURE 7 | Typical Percentile Gain of Specific Marzano Strategies on Raising Student Achievement

Note-taking	17%	Building Vocabulary	20%
Practice	14%	Effort and Recognition	14%
Student Discussion/Chunking	17%	Graphic Organizers	13%
Setting Goals/Objectives	25%	Homework	15%
Summarizing	19%	Identifying Similarities and Differences	20%
Tracking Student Progress and Using Scoring Scales	34%	Interactive Games	20%
		Nonlinguistic Representations	17%

Haystead & Marzano. (2009).

STUDIES ADDRESSING THE RELIABILITY OF OBSERVATIONS

Federal and state education reform guidelines stipulate that in choosing an evaluation model, school districts must select the model most likely to encourage fairness of classroom evaluations. To clarify: a teacher's evaluation score will be most fair when it accurately and objectively reflects that teacher's pedagogical strengths and weaknesses over time. Discussions of fairness have thus far centered on "inter-rater reliability": the idea that multiple observers, observing the same teacher and the same lesson, should achieve a high degree of consensus when scoring any given teacher. To ensure fairness and accuracy, school districts must provide thorough training for inter-rater reliability.

In *Gathering Feedback for Teaching*, however, MET authors went one step further. They analyzed not just multiple observers watching the same teacher teach the same lesson, but rather multiple observers watching the same teacher teach different lessons to different sections of students. The underlying assumption is that teacher behavior in the classroom will vary from lesson to lesson and perhaps from group to group of students, as teachers demonstrate different skill sets across lessons and course sections. These variations, it is assumed, will also be reflected in observer scores.

The MET study revealed surprising findings. Different sections of students appeared to have a negligible effect on variations in teacher scores. However, fully two-thirds of variation in teacher scores was attributable to factors other than persistent differences between teachers. In other words, when scores by multiple observers varied significantly, those variances were far more likely to be caused by the fact that a teacher was more or less skilled from one lesson to another or was displaying different skill sets from lesson to lesson.

The conclusion? To achieve an accurate portrait of teacher effectiveness, it is important that scores be averaged across more than one lesson to ensure fairness and accuracy. The MET study found that as the number of raters increased (inter-rater reliability) and the number of lessons observed increased (e.g., four different raters observing four different lessons), the higher the reliability of the scores for any individual teacher*.

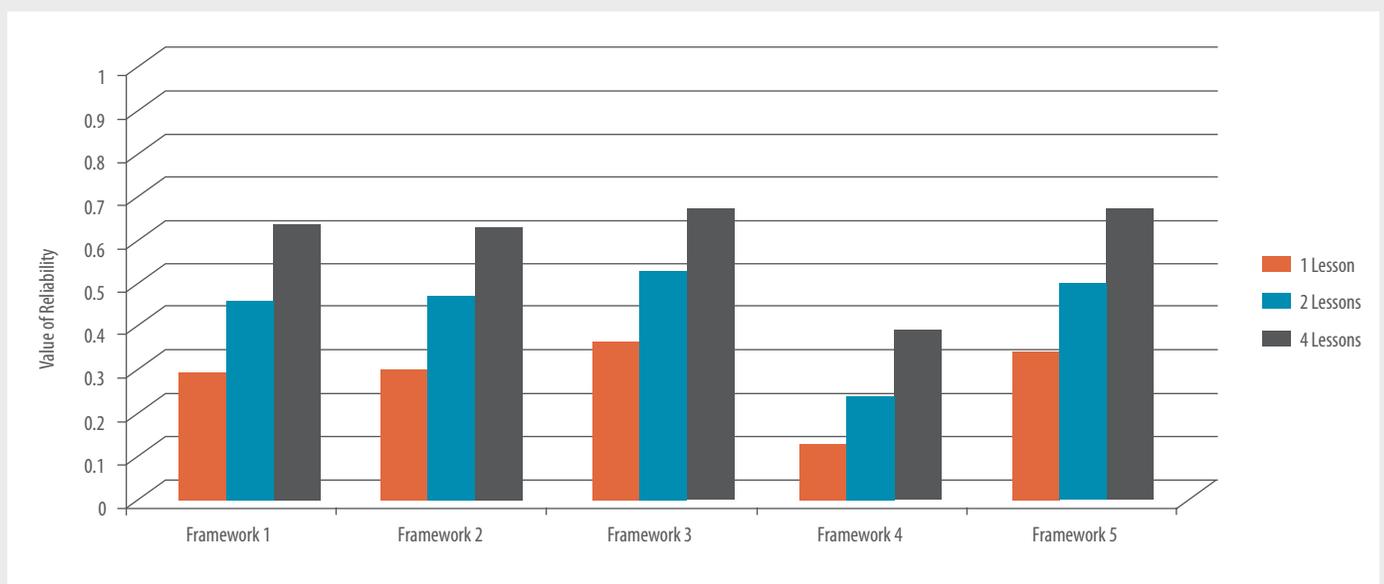


FIGURE 8 | Reliability of evaluation models increases across number of lessons

* The authors further note that variations in teacher scores may also be measured over time against comparisons with the individual teacher's student achievement scores from year to year.

RELIABILITY STUDIES FOR THE MARZANO CAUSAL TEACHER EVALUATION MODEL: CHERRY CREEK AND ROCKWALL

In 2010-2011, two school districts conducted reliability studies on evaluation models based on *The Art and Science of Teaching*: Cherry Creek School District in Denver, Colorado, and Rockwall Independent School District in Rockwall, Texas.

The reliability studies were conducted to determine (1) the level of agreement between raters when identifying which of 41 categories of strategies were exhibited during a brief observation and (2) the level of agreement between raters when assigning scores to teachers on specific strategies.

A total of 109 teachers and administrators from these two districts met for one-half day. Organized into small groups, the raters watched a five-minute video of a teacher in the classroom. They were then asked to identify which of the 41 strategies in the protocol the teacher had employed. Next, individuals shared their categories with their groups and then were asked to re-rate their observations. They could change their categories or leave them as is.

The data from this set of interactions was used to answer the question: What is the level of agreement between raters when identifying the categories of strategies exhibited during a brief observation?

Raters then viewed the same five-minute video again. Participants independently scored the teacher on the five-point scale used in the Marzano Causal Teacher Evaluation Model. Again, raters shared their scores and were then allowed to change or retain their scores.

Individual raters can identify which of the 41 strategies are being employed by the observer with a relatively high degree of accuracy.

The data from this set of interactions was used to answer the question: What is the level of agreement between raters when assigning scores on specific elements? The Rockwall participants repeated the exercise with three additional videos; the Cherry Creek participants with an additional two.

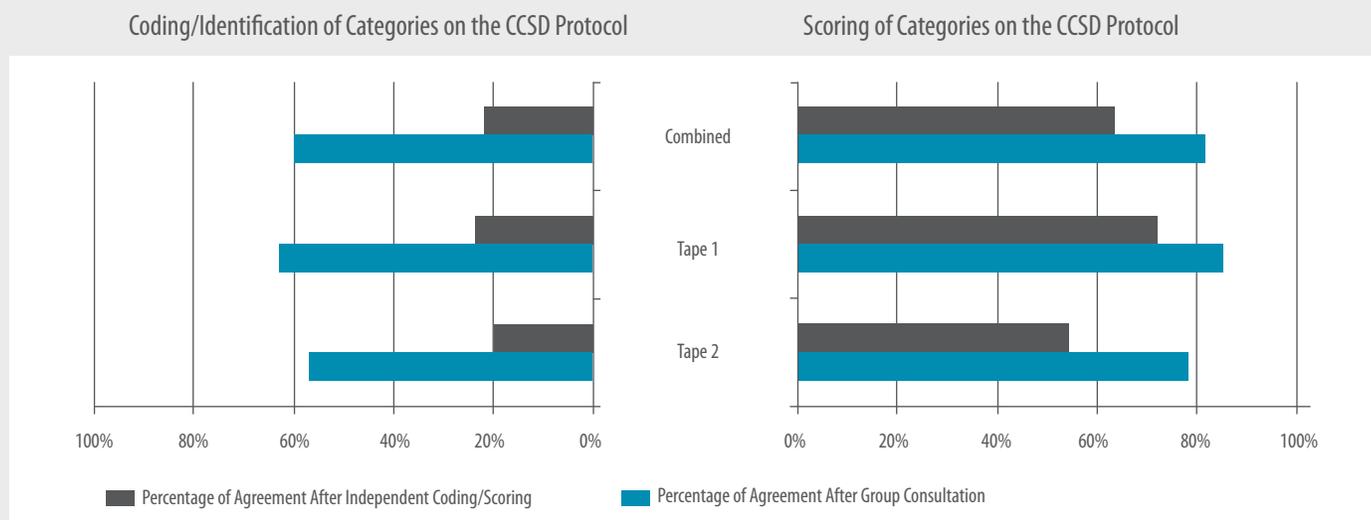


FIGURE 9 | Increases in agreement at Cherry Creek

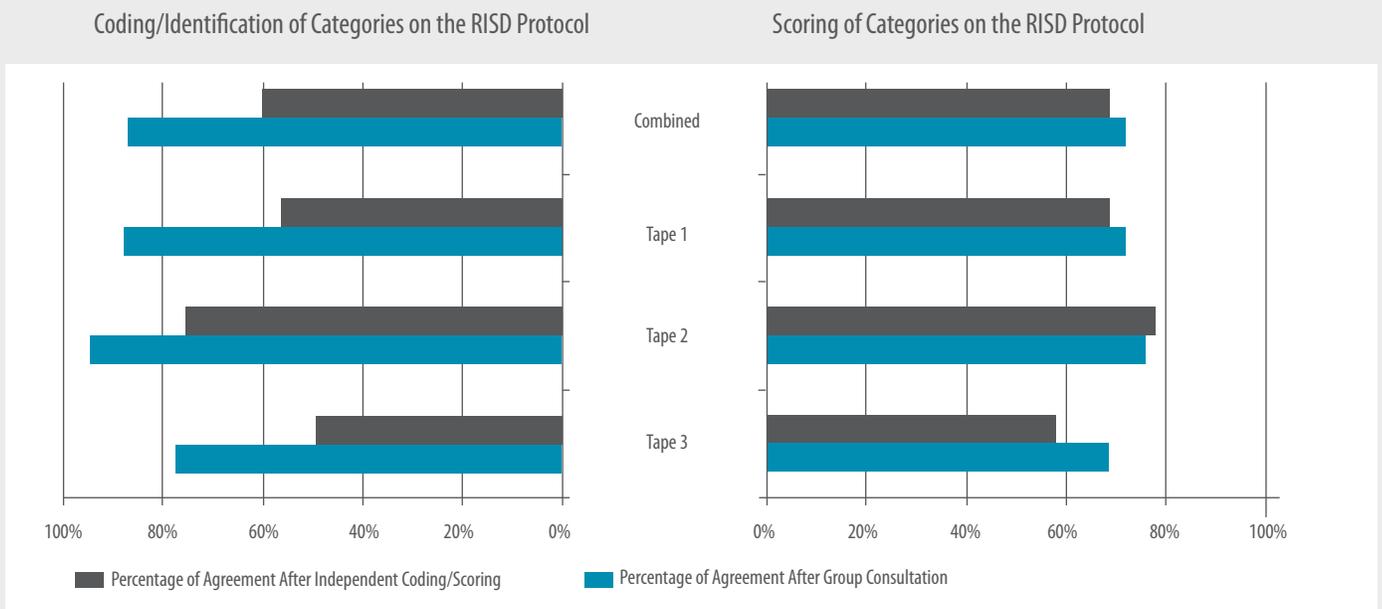


FIGURE 10 | Increases in agreement at Rockwall

RESULTS

As demonstrated in Figures 9 and 10, agreement on recognition of categories increased substantially, at both Rockwall and Cherry Creek, after consultation with peers viewing the same video. Figures 9 and 10 also demonstrate a similarly substantial increase in agreement in scoring of teacher proficiency after consultation.

Taking the findings of these reliability studies at face value, it's possible to conclude that after a brief orientation, an individual rater can identify which of the 41 strategies are being employed by the observer with a relatively high degree of accuracy (from 50 to well over 70 percent). However, with brief consultation with another observer, inter-rater reliability regarding which instructional strategies are being used by a teacher increases substantially, even with minimal training.

Scoring of performance within categories seems to have a similar pattern. Individual raters exhibit reasonably high accuracy when working independently, but this accuracy increases with consultation with other raters. In short, observations of teachers using the Marzano Teacher Evaluation Model are acceptably reliable with independent raters, but the reliability of observations increases when consultation is available.

Rater agreement was considerably larger than the inter-rater reliabilities reported in the MET study for a single rater scoring a single lesson.

PROJECTED RELIABILITY ACROSS TWO RATERS

As part of the Marzano classroom observer training in 2012, Dr. Peggy Schooling gathered rater reliability data in 41 Florida schools. Following three days of training on the instructional framework, participants rated specific elements from Domain 1 in the Marzano Causal Teacher Evaluation Model (elements 1-5, 26, and 27). Organized into small groups, raters individually read over the specific elements and performance rating scale followed by a review of a three- to five-minute video segment. They were then provided with the specific element to rate individually, followed by a discussion where raters were instructed to form groups to obtain consensus. Finally, individual rater scores and group scores were compared with expert scores.

Data from the video ratings were collected and analyzed for agreement. Raters scored 10 videos, rating the instructor on a 5-point scale: (0) Not Using, (1) Beginning, (2) Developing, (3) Applying, and (4) Innovating. The percentage of agreement was then calculated for each element (see Figure 11). The average agreement score across the seven elements was 60 percent. It should be noted that this agreement is considerably larger than the inter-rater reliabilities reported in the MET study for a single rater scoring a single lesson.

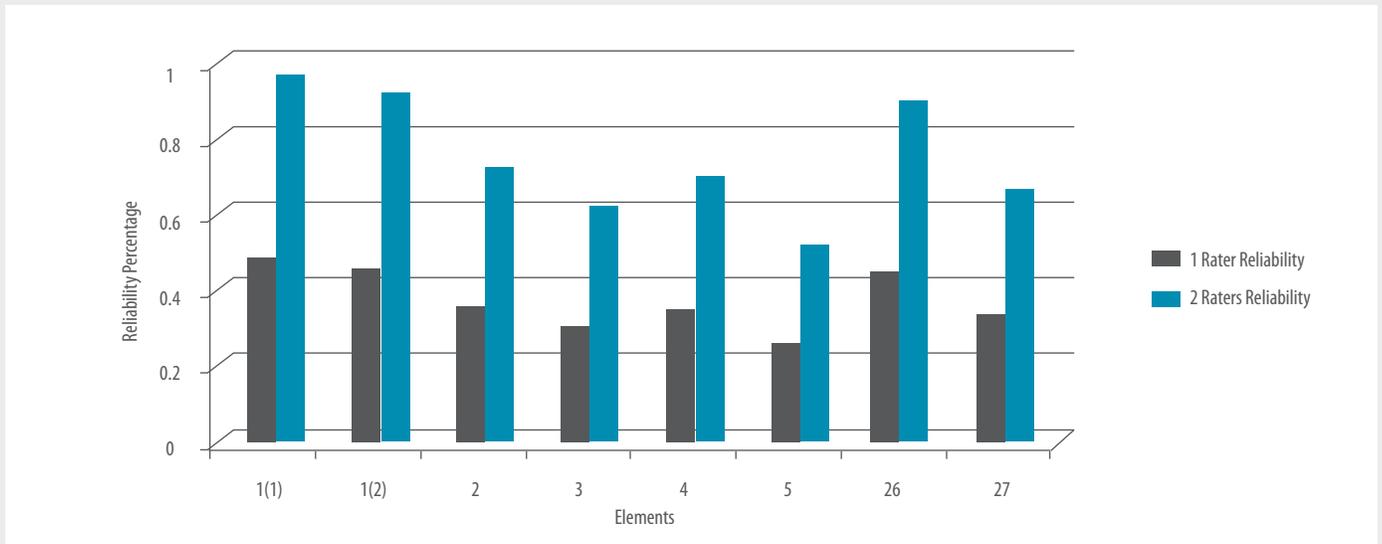


FIGURE 11 | Marzano Causal Teacher Evaluation Model reliability percentages for related elements

It is possible to further project increased rater reliability across two or more raters, as a partial comparison with the MET project percentages. To achieve probable reliability scores when the scores of two raters are averaged, the Spearman-Brown prediction formula was used (Figure 12).

$$p_{xx'}^* = \frac{Np_{xx'}}{1 + (N-1)p_{xx'}}$$

FIGURE 12 | The Spearman-Brown prediction formula*

When rating for a particular lesson, reliability was calculated at .75. As noted, the Marzano Center continues to collect data and refine controls (procedures now limit observer group size to four, for instance, and sort elementary and secondary school teachers into separate groups). Further research is necessary to test the hypothesis across multiple raters and multiple lessons.

Average predicted two-rater reliability across the elements is .75.

As indicated in Figure 11, the predicted reliability when ratings of two observers are averaged ranged from a low of about .50 to a high of about .90. The average two-rater reliability across the elements in Figure 11 is .75. Further research is necessary to examine reliabilities across multiple lessons and multiple classes for a single teacher.

*The Spearman-Brown formula is used in educational measurement to predict the reliability of a test after the test length has been changed. In this case, the formula predicts rater reliability when a second rater is added to observation of individual lessons.

FORTHCOMING STUDIES

The Marzano Causal Teacher Evaluation Model is relatively new to the field of teacher evaluation, although the Art and Sciences of Teaching framework has been used by schools and districts as the official or unofficial language of a common language of instruction for more than a decade. As described in this report, the research behind the model is substantial and continues to grow. Studies completed, but not described in this report because findings are not yet available to the general public, include the following:

- » A study involving random assignment of teachers to the Marzano Teacher Evaluation Model or another evaluation model commonly used across United States schools. On a number of measures, the Marzano Teacher Evaluation Model was judged superior to the alternate model by participating teachers in terms of improving their pedagogical skills.
- » A study analyzing the journal entries of teachers using the Marzano Teacher Evaluation Model over a semester's period of time.
- » A study examining the correlations between elements of the Marzano Teacher Evaluation Model and student learning of the central concepts addressed in a single lesson (as opposed to end-of-the-year tests).

Learning Sciences Marzano Center continues to conduct research on the Marzano Teacher Evaluation Model. Schools and districts interested in becoming involved in studies such as these or who would like to conduct an independent study, are invited to contact the Marzano Center.

CONCLUSION

As states and districts move forward in fulfilling the goals established by state education reform initiatives, it will be imperative to develop advanced predictive and diagnostic metrics that both assess teacher classroom behavior and measure and facilitate teacher improvement over time. As noted previously, evaluation instruments should identify strengths and weaknesses in teacher practice with the goal of growth. As teachers become better teachers, their students will become better students.

At the same time, states and districts will refine their own tools to assess student learning, drawing on recommendations from projects such as the MET study to gain a more nuanced understanding of the systems that measure and predict student achievement and student growth for the long term. The Learning Sciences Marzano Center will continue to identify and develop the resources needed to significantly impact teacher growth and student achievement. Visit MarzanoCenter.com for a full slate of the tools, training, and research to help meet those goals.

Phone: 877.411.7114

www.MarzanoCenter.com

www.LearningSciences.com

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VIDEO RESOURCES

Dr. Marzano Addresses the Critical Need for a Robust Model of Instruction

Dr. Robert Marzano defines a robust and comprehensive model of instruction and suggests how districts can integrate his Art and Science of Teaching Observation and Feedback Protocol into their own existing models.

Website | www.iObservation.com/Marzano-Suite/Videos/dr-marzano-addresses-the-critical-need-for-a-robust-model-of-instruction

Distinguishing Evidence from Research

Dr. Marzano explains the phrase “evidence-based” and how it works.

Website | www.iObservation.com/Marzano-Suite/Videos/distinguishing-evidence-from-research

Dr. Marzano Describes Three Phases in the Development of a District System

Dr. Marzano discusses three phases of supporting effective teaching in every classroom.

Website | www.iObservation.com/Marzano-Suite/Videos/dr-marzano-describes-3-phases-in-the-development-of-a-district-system

Implementing Strategies to Get Student Gains

Experts discuss more than 400 studies that Dr. Marzano has conducted across the country with teachers in classrooms on specific strategies within the Marzano Causal Teacher Evaluation Model to demonstrate the effect on student achievement. All the studies show that, on average, students gain 15 to 20 percentile points.

Website | www.iObservation.com/Marzano-Suite/Videos/implementing-strategies-to-get-student-gains

iOBSERVATION

iObservation is the real-time data and instructional improvement system that monitors the implementation and effectiveness of the common language/model of instruction across schools and classrooms. iObservation provides districts and schools with a system to:

- » Collect, monitor, and analyze data to support the implementation and adoption of Dr. Marzano's common language/model of instruction through walkthroughs, observations, instructional rounds, teacher self-assessments, and evaluations
- » Engage teachers in the process - teachers participate directly in assessing their classroom practice against the common language/model of instruction
- » Have teachers create growth plans, track their progress, and access aligned professional development resources
- » Collect and analyze student gain data from every student for every teacher
- » Differentiate professional development based on the assessed needs of each teacher

AUTHORS

Robert J. Marzano, Ph.D., is Executive Director of the Learning Sciences Marzano Center for Teacher and Leadership Evaluation. He is also CEO of Marzano Research Laboratory and Executive Director of Marzano Regional Educational Library - Central. A leading researcher in education, he is a speaker, trainer, and author of more than 30 books and 150 articles on topics such as instruction, assessment, writing and implementing standards, cognition, effective leadership, and school intervention. His books include *District Leadership That Works*, *Making Standards Useful in the Classroom*, *The Art and Science of Teaching*, and *Effective Supervision*.

His practical translations of the most current research and theory into classroom strategies are internationally known and widely practiced by both teachers and administrators. 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.

Michael Toth is founder and Chief Executive Officer of Learning Sciences International, iObservation, and the Learning Sciences Marzano Center. Formerly the President of the National Center for the Profession of Teaching, a university faculty member, and director of research and development grants, Mr. Toth transformed his university research and development team into a company that is focused on leadership and teacher professional development and instructional effectiveness correlated to student achievement gains. Mr. Toth is actively involved in research and development; gives public presentations; and advises education leaders on issues of leadership and teacher effectiveness.

Peggy Schooling, Ed.D., is Director of Curriculum and Instruction and Professional Development Services for Learning Sciences International and iObservation. Dr. Schooling holds a doctoral degree and Superintendent's Letter of Eligibility from Immaculata University. She has 30 years experience as an educator, having worked in a variety of public and private settings with diverse student populations from birth through high school. Dr. Schooling has served as classroom teacher, speech pathologist, staff developer, elementary assistant principal, elementary principal, central office administrator, and educational consultant. Her responsibilities and expertise include systems change efforts, curriculum and instruction, design and evaluation of professional development, federal programs, early childhood, and K-12 literacy. She has been active with the Pennsylvania Department of Education as a member of the Governor's Early Learning Task Force and has served as a grant reviewer. Dr. Schooling contributed to and authored several professional publications and video productions. She serves as Adjunct Graduate Professor at Alvernia College and Immaculata University and presents at local, state, and national conferences.



APPENDIX A

DOMAIN 1 MARZANO CAUSAL TEACHER EVALUATION MODEL

Website | www.MarzanoCenter.com/files/WP_CAS_AppendixA.pdf

THE MARZANO ART AND SCIENCE OF TEACHING OBSERVATION & FEEDBACK PROTOCOL

41 KEY STRATEGIES IDENTIFIED BY RESEARCH FOR EFFECTIVE TEACHING

Researched by Dr. Robert Marzano

What will I do to establish and communicate learning goals, track student progress, and celebrate success?

Research-based strategies for establishing learning goals, tracking student progress, and celebrating success:

- 1) Providing Clear Learning Goals and Scales (Rubrics)
- 2) Tracking Student Progress
- 3) Celebrating Success

What will I do to establish and maintain classroom rules and procedures?

Research-based strategies for establishing and maintaining classroom rules and procedures:

- 4) Establishing Classroom Routines
- 5) Organizing the Physical Layout of the Classroom

What will I do to help students actively interact with new knowledge?

Research-based strategies for introducing new content to students and interacting 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) Processing New Information
- 11) Elaborating on New Information
- 12) Recording and Representing Knowledge
- 13) Reflecting on Learning

What will I do to help students practice and deepen their understanding of new knowledge?

Research-based strategies where students are practicing and deepening their 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

What will I do to help students generate and test hypotheses about new knowledge?

Research-based strategies where students are generating and testing hypotheses:

- 21) Organizing Students for Complex Tasks
- 22) Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing
- 23) Providing Resources and Guidance

What will I do to engage students?

Research-based strategies for engaging students:

- 24) Noticing when Students are Not Engaged
- 25) Using Academic Games
- 26) Managing Response Rates
- 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

What will I do to recognize and acknowledge adherence and lack of adherence to rules and procedures?

Research-based strategies for recognizing and acknowledging adherence or lack of adherence to rules and procedures:

- 33) Demonstrating “With-it-ness”
- 34) Applying Consequences for Lack of Adherence to Rules and Procedures
- 35) Acknowledging Adherence to Rules and Procedures

What will I do to establish and maintain effective relationships with students?

Research-based strategies for establishing and maintaining effective relationships with students:

- 36) Understanding Students’ Interests and Backgrounds
- 37) Using Verbal and Nonverbal Behaviors that Indicate Affection for Students
- 38) Displaying Objectivity and Control

What will I do to communicate high expectations for all students?

Research-based strategies for 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 by Low Expectancy Students



APPENDIX B

MARZANO SUITE TOOLS

Website | www.MarzanoCenter.com/files/WP_CAS_AppendixB.pdf



APPENDIX C

META-ANALYTIC SYNTHESIS OF STUDIES CONDUCTED AT MARZANO RESEARCH LABORATORY ON INSTRUCTIONAL STRATEGIES

Website | www.MarzanoCenter.com/files/WP_CAS_AppendixC.pdf



APPENDIX D

MARZANO CAUSAL TEACHER EVALUATION MODEL LEARNING MAP

Website | www.MarzanoCenter.com/files/LearningMap_4Domains.pdf



APPENDIX E

DR. MARZANO'S SUITE FOR CONNECTING TEACHER GROWTH TO STUDENT ACHIEVEMENT

Website | www.MarzanoCenter.com/files/Marzano-Race-to-the-Top-White-Paper.pdf



APPENDIX F

CONTEMPORARY REFERENCES 2000-2011

Website | www.MarzanoCenter.com/files/Contemporary%20References%202000-2011-1.pdf