October 2010

MET project

BILL & MELINDA GATES foundation

The MQI Protocol for Classroom Observations

Overview of Classroom Observation Protocols

A teacher's classroom instructional practice is perhaps one of the most important[1] yet least understood factors contributing to teacher effectiveness. The method of video capture and review designed for the Measures of Effective Teaching (MET) project seeks to demystify effective teaching practices in the classroom and, in turn, provide insights into teacher evaluation and professional development.

The video footage recorded during the MET project is watched and coded by highly trained, independent raters. Many of the raters are current or former teachers, some with National Board Certification in subjects they are assigned to watch. These raters are managed and trained by the Educational Testing Service (ETS) to observe the videos and rate the teaching practice on a series of indicators ranging from the teacher's ability to establish a positive learning climate and manage the classroom to his or her ability to explain concepts and provide useful feedback to students. ETS is training approximately 500 experts to rate more than 23,000 hours of videotaped lessons using one or more of the following observation protocols:

1. The Classroom Assessment Scoring System (CLASS) measure developed at the University of Virginia
2. The Framework for Teaching (FFT) developed by Charlotte Danielson
3. The Mathematical Quality of Instruction (MQI) developed at the University of Michigan and Harvard University
4. The Protocol for Language Arts Teaching Observation (PLATO) developed at Stanford University
5. The Quality Science Teaching (QST) developed at Stanford University

A subset of the videos are also rated using an observational protocol developed by the National Board of Professional Teaching Standards (NBPTS) and the National Math and Science Initiative (NMSI).

The scores on the observational protocols will be compared against value-added measures for both the statewide standardized assessment and on supplemental assessments. These analyses will establish how closely the observation scores (both overall and domain-level) correlate with improvements in student achievement. (See www.METproject.org for more information about this process.)

[1] Steven G. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," *Econometrica,* Vol. 73, No. 2 (March 2005), pages 417–458.
http://edpro.stanford.edu/Hanushek/admin/pages/files/uploads/teachers.econometrica.pdf

About the MQI Method for Evaluating Classroom Observation

The Mathematical Quality of Instruction (MQI) observational instrument was developed by Heather Hill in collaboration with research colleagues at the University of Michigan and Harvard University. The instrument is designed to reliably measure the mathematical work that occurs in classrooms, on the theory that that work is distinct from classroom climate, pedagogical style, or the deployment of generic instructional strategies. The MQI instrument is based on a theory of instruction that focuses on resources and their use (Cohen, Raudenbush & Ball, 2003), existing literature on effective instruction in mathematics (e.g., Borko, Eisenhart et al., 1992; Ma, 1999; Stigler & Hiebert, 1999; Thompson & Thompson, 1994) and on an analysis of nearly 250 videotapes of diverse teachers and teaching. The last analysis allowed MQI authors to tailor the instrument to the variety of mathematics instruction present in the U.S. today.

During the MQI instrument development and pilot process (2003-2010), researchers determined there was a significant relationship between teachers' MQI scores and their mathematical knowledge for teaching as well as between MQI scores and student outcomes, finding both to be significant and substantially large (Hill et al., 2008; Hill, Kapitula & Umland, 2010). The MQI protocol has also been subject to several studies that examine the best conditions for arriving at accurate and generalizable scores for specific teachers.

The MQI instrument provides separate scores for different elements of effective mathematics teaching that help define the relationships among the teacher, students, and content. For instance, teachers' interactions with students, students' participation in the mathematical work of the lesson, and the extent of meaning imbued to mathematical ideas and procedures are scored separately. Separately scoring each dimension makes the MQI unique among instruments that measure the effectiveness of mathematics instruction by providing a holistic and balanced view of the numerous elements that, taken together, comprise effective mathematics instruction.

MQI Elements

The MQI instrument measures the mathematical quality of instruction by assessing the relationship among the teacher, the student, and mathematical content using five elements: richness of the mathematics; errors and imprecision; working with students and mathematics; student participation in meaning-making and reasoning; and connections between classroom work and mathematics. Each element is used to help assess one of three relationships: teacher-content, teacher-student, or student-content.

Teacher-Content Relationship:

Richness of the Mathematics*:* Richness includes two pieces: attention to the meaning of mathematical facts and procedures, and engagement with mathematical practices and language.

Meaning-making includes explanations of mathematical ideas and drawing connections among different mathematical ideas (e.g., fractions and ratios) or different representations of the same idea (e.g., number line, counters, and number sentence).

Mathematical practices are represented by multiple solution methods, where more credit is given for comparisons of solution methods for ease or efficiency; by developing mathematical generalizations from examples; and by the fluent and precise use of mathematical language.

Errors and Imprecision: Captures whether the teacher makes **major errors** that indicate gaps in his or her mathematical knowledge, whether the teacher **distorts content** through unclear articulation of concepts, and whether there is a **lack of clarity** in the presentation of content or the launch of tasks.

Teacher-Student Relationship:

Working with Students and Mathematics: Captures whether the teacher accurately interprets and **responds to students' mathematical ideas** and whether the teacher **corrects student errors** thoroughly, with attention to the specific misunderstandings that led to the errors.

<u>**Student-Content Relationship:**</u>

Student Participation in Meaning-Making and Reasoning: Captures the ways in which students engage with mathematical content, specifically:

Whether **students ask questions and reason about mathematics**; whether students provide **mathematical explanations** on their own or in response to the teacher's questions; and the **cognitive requirements** of a specific task, such as whether students are asked to find patterns, draw connections or explain and justify their conclusions.

Connections Between Classroom Work and Mathematics: Captures **whether classroom work has a mathematical point**, or whether the bulk of instructional time is spent on activities that do not develop mathematical ideas, such as cutting and pasting, or on non-productive uses of time, such as transitions or discipline.

Observation Process

The MQI protocol is designed primarily for use assessing videotaped instruction. Each videotaped lesson is divided into roughly equal-length five- to seven-and-a-half-minute segments for scoring. Raters assign each segment a score for each of the five MQI elements, and also assign the whole lesson an overall MQI score. Two raters working independently of one another score each lesson, and scores are averaged across lessons to comprise a teacher score.

Studies of the MQI suggest scoring three of a teacher's lessons will yield an accurate and generalizable score.

For More Information

For more information on the MQI protocol, its history, or its developers, contact Nina Cohodes at nina_cohodes@gse.harvard.edu or 617-496-4815.

About the MET Project

A teacher has more impact on student learning than any other factor controlled by school systems, including class size, school size and the quality of after-school programs—or even which school a student is attending[2]—but currently, there is no agreement among education stakeholders about how to identify and measure effective teaching. In an effort to improve the quality of information about teaching effectiveness, in the fall of 2009, the Bill & Melinda Gates Foundation launched the two-year MET project to rigorously develop and test multiple measures of teacher effectiveness.

As part of the project, partners from more than a dozen reputable academic, non-profit and for-profit organizations are collecting and analyzing data collected during the 2009-10 and 2010-11 school years from over 3,000 teacher volunteers and their classrooms across Charlotte-Mecklenburg Schools, Dallas Independent School District, Denver Public Schools, Hillsborough County Public Schools, Memphis City Schools and the New York City Department of Education. Teachers and classrooms in Pittsburgh Public Schools are also participating in the project by helping researchers with early-stage development and testing of the effectiveness measures before they are tested in the other MET project districts.

The project's data is collected across five critical research areas:

1. Student achievement gains on state standardized assessments and supplemental assessments designed to measure higher-order conceptual thinking
2. Classroom observations and teacher reflections
3. Teachers' pedagogical content knowledge
4. Student perceptions of the classroom instructional environment
5. Teachers' perceptions of working conditions and instructional support at their schools

A close analysis of each of these will help establish which teaching practices, skills and knowledge positively impact student learning and represents a real opportunity for teachers to inform the national discussion on education reform.

The MET project seeks to develop an array of measures that will be viewed by teachers, unions, administrators and

[2] Steven G. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," *Econometrica,* Vol. 73, No. 2 (March 2005), pages 417–458. http://edpro.stanford.edu/Hanushek/admin/pages/files/uploads/teachers.econometrica.pdf

policymakers as reliable and credible indicators of effective teaching. By determining exactly what measures predict the biggest student achievement gains, the MET project will give teachers the feedback (including exemplary practices) they need to improve. In addition, a greater understanding about which teaching practices, skills and knowledge positively impact student learning will allow states and districts to develop teacher evaluation systems that will help strengthen all aspects of teaching—from recruitment through retention.

The MET project's final findings will be shared broadly at the project's conclusion in winter 2011-2012.

For more information about the MET project, please visit www.METproject.org or send an email to info@METproject.org..

Note: The inclusion of a given research protocol or tool in the MET project is not an endorsement by either the MET project or its partners of that protocol or tool. In many cases, the research instruments included in the MET project are still being tested and do not yet have verified results associated with them. Other protocols and tools similar or equivalent to those used in the MET project may exist.