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SURVEY OF U.S. MIDDLE SCHOOL MATHEMATICS TEACHERS AND TEACHING

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Question: What is the Current State of Mathematics Education in the United States?

Anecdotal evidence suggests that new teaching methods, technologies, and curriculum materials have appeared in U.S. mathematics classrooms over the last two decades. Many of these innovations are associated with principles for mathematics instruction developed by the National Council for Teachers of Mathematics (NCTM), as well as the Common Core State Standards. In 2015, we began collecting data for a study designed to understand the consequences of these standards and curricular changes for classroom mathematics instruction. As part of this study, we asked a randomly selected sample of U.S. middle school mathematics teachers to self-vidiotape up to four lessons using a Samsung Galaxy 4 tablet.

158
TEACHERS

Data Collection and Analysis: Scoring Lessons 7.5 Minutes at a Time

To date, we have received videos from 158 teachers from 43 states. We have begun analyzing this video using the Mathematical Quality of Instruction (MQI) instrument, which measures instructional practices along three domains (see below). For each domain, MQI raters assigned scores to 7.5-minute segments of instruction, with scores indicating that elements of the domain were not present, minimally present (low), present (mid), or present with extended/strong implementation (high).

43
STATES

MATHEMATICAL QUALITY OF INSTRUCTION (MQI)

An observational rubric that provides a framework for analyzing mathematics instruction in several domains. Within each domain, individual codes contain score points that categorize instruction into different levels of quality.

Richness of the Mathematics

How mathematical explanations, representations, language, and generalizations are developed in a lesson
Also measures the extent to which teacher and students engage in mathematical sense-making

Working With Students and Mathematics

How teachers listen to and address students' mathematical ideas and misconceptions

Common Core-Aligned Student Practice

The extent of student participation in mathematical reasoning, explanation, and communication
Also measures student engagement with cognitively challenging tasks

Figure 1: Score Distributions for Segments in Each MQI Domain

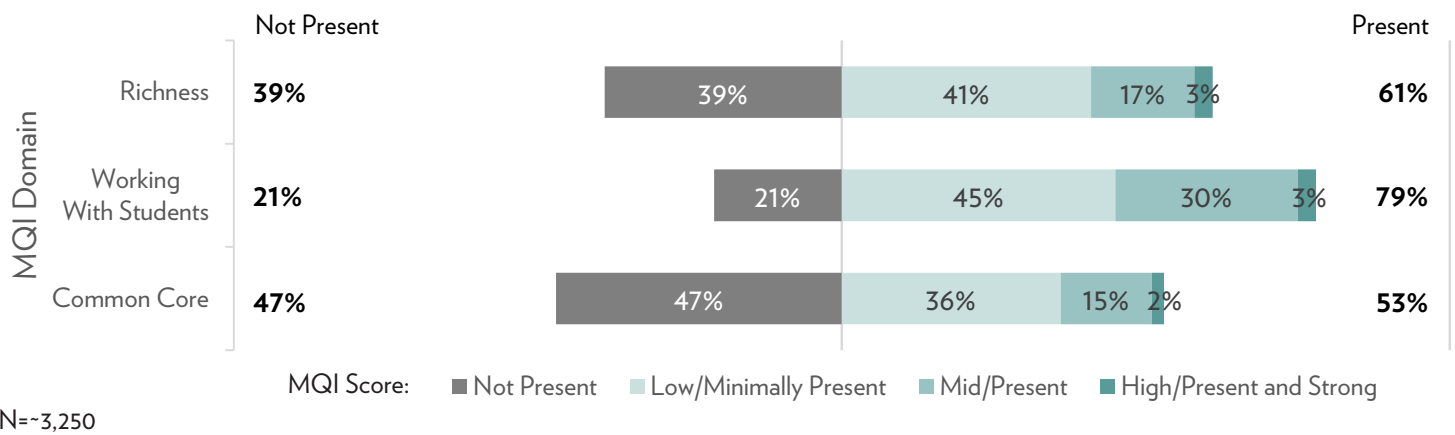
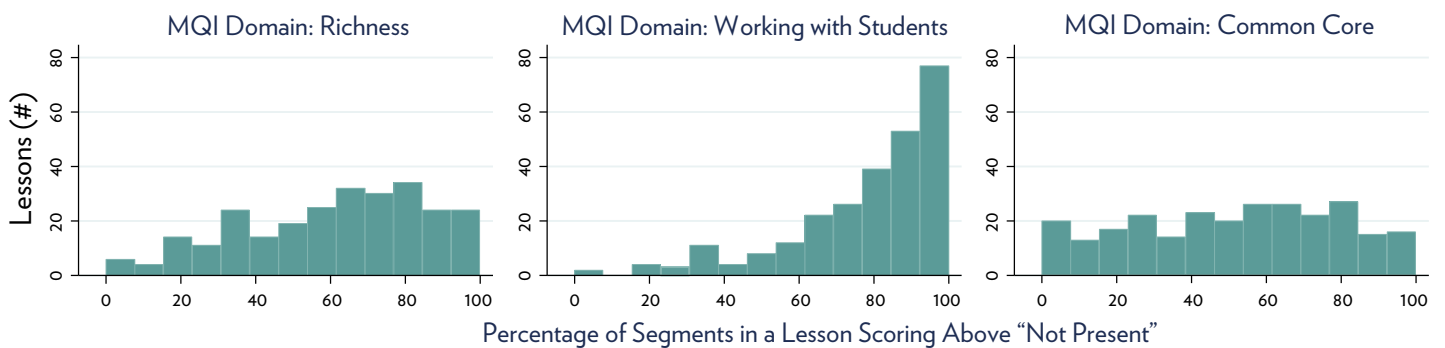


Figure 2: Early Results from MQI Scoring



Early Results: Instruction Aligned with Recent Standards

Early results suggest that most U.S. middle school classrooms contain instructional practices promoted by recent standards. For instance, Figure 1 shows that segments received scores above “not present” for Richness 61% of the time, above “not present” for Working With Students 79% of the time, and above “not present” for Common Core-Aligned Student Practices 53% of the time. For the Richness and Common Core domains, however, raters were roughly twice as likely to use the low score point than the mid and high score points combined, suggesting that most of the standards-based classroom practices appeared only briefly. The data also suggest strong variability in the use of these elements across lessons; Figure 2 shows the proportion of all segments, aggregated by lesson, that fall above not present for the domain. For the Richness and Common Core domains, lessons ranged from those in which all segments were scored as “not present” to ones in which all segments scored above “not present,” with an almost uniform distribution in both cases.

Implications for the Field: A Good Start, but Room for Improvement

These findings suggest that the classrooms in our study do use instructional practices in line with recent standards, but that in most cases the implementation of those practices could be improved to higher levels of quality. This, in turn, suggests that professional development programs can build upon teachers’ existing instructional practices with the hope of extending the classroom time devoted to standards-based practices as well as improving those practices’ level of detail, precision, and focus on mathematical meaning.