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Common Core State Standards for Mathematics: Middle School Mathematics Teachers' Perceptions

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Executive Summary

In spring 2013, we surveyed the perceptions of 403 middle school mathematics teachers with regard to the Common Core State Standards for Mathematics (CCSSM) (Common Core State Standards Initiative, 2010). The CCSSM have now been adopted by 45 states, the District of Columbia, and four U.S. territories as of May 2013 and, as a result, constitute a U.S. national intended curriculum in mathematics (Porter, McMaken, Hwang, & Yang, 2010). The main findings of the survey are presented below:

1. There has been a slight increase from prior surveys in teachers' reported understandings of the CCSSM and their perceptions of the rigor of the CCSSM:
   - 86.1% of the teachers stated they were familiar with the CCSSM Content Standards and 87.1% of the teachers stated they were familiar with the CCSSM Standards for Mathematics Practice.
   - 86.3% of the teachers felt that the CCSSM Content Standards were more rigorous than their state standards and 87.4% felt that the CCSSM Standards for Mathematics Practice were more rigorous.

2. Many participants felt that the CCSSM are multifaceted in their rigor, holding teachers accountable to both procedural fluency and conceptual understanding:
   - Over 60% of the participants stated that the CCSSM emphasized procedural and computational fluency ***and*** emphasized problem solving, communication, and activities exploring topics.
   - Moreover, over 40% stated that the CCSSM would require them to teach more for procedural and computational fluency ***and*** teach more for conceptual understanding.

3. Participants perceived that their districts need to update their textbook adoptions to reflect the changes in the CCSSM from the current state standards:
   - Results of the survey show that slightly over two-thirds of the teachers are using textbooks that were adopted prior to implementation of the CCSSM.
   - One-third of the participants stated a need for more support in implementing the CCSSM Content Standards and Standards for Mathematical Practice, including better-aligned curriculum materials.
   - In the absence of these materials, just over 60% of the participants are regularly accessing online resources to supplement their existing textbooks and others are creating their own curriculum materials.

Implications

The overall findings suggest:

- Middle school mathematics teachers can benefit from professional development that focuses on how to meaningfully incorporate the Mathematical Practice Standards.
- Professional development needs to focus on pointing out new content compared with previous state curriculum frameworks.
- In the absence of CCSSM-aligned curriculum materials, teachers need professional development focusing on how to identify online materials to determine their quality and the degree to which they align with the CCSSM Content Standards and embody the CCSSM Standards for Mathematical Practice.

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Common Core State Standards for Mathematics: Middle School Mathematics Teachers' Perceptions

The Common Core State Standards for Mathematics[1] (CCSSM) (Common Core State Standards Initiative, 2010) have now been adopted by 45 states, the District of Columbia, and four U.S. territories as of May 2013 and, as a result, constitute a U.S. national intended curriculum in English Language Arts and Mathematics (Porter, McMaken, Hwang, & Yang, 2010). Although the CCSSM were designed for a number of different audiences, teachers are the key implementers who will translate this document from an intended curriculum into an enacted curriculum, providing students with opportunities to learn many important mathematical ideas. Mathematics teachers are entrusted with the task of interpreting the standards comprising the CCSSM and determining how to best provide opportunities for their students to learn the mathematics articulated in those standards.

Educational leaders provide various types of support for mathematics teachers as they prepare to implement the CCSSM. Indeed, a recent survey conducted by EPE Research Center (2013) found that the most common source of information about the Common Core State Standards (CCSS) were administrators. As leaders prepare to support teachers in interpreting and enacting the CCSSM, a first step is to understand how teachers perceive these standards. This paper presents the results of a survey administered to a sample of 403 middle school mathematics teachers (MSMT) across the United States. This survey was designed to examine teachers' perceptions and understandings of the CCSSM, teachers' wider beliefs about mathematics, and teachers' planning practices. As part of understanding the context for ongoing efforts to support teachers, survey items also focused on school districts' professional development practices. The implications of these results for educational leaders as they design professional development experiences for teachers to understand and implement the CCSSM will be discussed.

[1]While the focus of this study is on the Common Core State Standards for Mathematics, previous surveys have investigated teachers' conceptions of the Common Core State Standards in which the Mathematics Standards are not distinguished from the English Language Arts Standards. Throughout this paper, CCSSM is used to refer to the Common Core State Standards for Mathematics and CCSS to refer to the document incorporating both the Mathematics Standards and English Language Arts Standards.

Background

Common Core State Standards

The CCSS represent an important curricular policy shift for the educational system in the United States. The CCSS, developed collectively by the National Governors Association Center for Best Practices and the Council of Chief State School Officers, are the United States' first set of national standards to become a part of educational policy in a coordinated and comprehensive way. Moreover, as two consortia are now rushing to create CCSS-aligned assessments designed to measure students' college and career readiness as well as their progress in meeting the standards, high-stakes assessment will change significantly from the current state-wide assessment system (where each state has its own set of assessments aligned with its unique state curriculum frameworks). The federal government is promoting the adoption of the CCSS by tying it to a variety of components within its Race to the Top funds (Duncan, 2009a; 2009b). Additionally, the number of states connecting student achievement to teacher evaluation is increasing. For instance, in 2009 only four states used student achievement as a component of how teacher performance was assessed. As of 2012, 20 states now use student achievement as an important element of teacher evaluations (National Council on Teacher Quality, 2012). Student achievement measures will be – or, in some states, already are – connected to CCSSM content and, thus, the CCSSM are a key component of the shifting U.S. educational landscape.

Examining the Content of the CCSSM

Porter et al. (2010) compared the CCSSM against 27 state standards and assessments used by 16 states, the *Principles and Standards for School Mathematics* (PSSM) (National Council of Teachers of Mathematics, 2000), standards in top-performing countries, and descriptions of the practices of a sample of teachers across the United States. Porter et al. used a matrix consisting of mathematics topics and cognitive demand to compare the degree of similarity between state standards and the CCSSM. With a value of 1 representing perfect alignment, the average of the alignment between state standards and the CCSSM was .25. There was a similar degree of alignment between the CCSSM and the PSSM. In terms of cognitive demand, Porter et al. report that the CCSSM contained a greater emphasis on the higher cognitive demand category of *demonstrate understanding* and less emphasis on lower levels of cognitive demand *memorize* and *perform procedures* than the state standards. Out of 16 topics, the CCSSM contained a greater emphasis than state frameworks on a total of five topics: number sense, operations, measurement, basic algebra, and geometric concepts.

Porter et al. (2010) also compared the focus of the CCSSM with the focus of former state standards using two different measures. First, they enumerated the number of cells in the matrix needed to include 80% of the total content. Second, they counted the number of cells that contained 1% or more of total content. On the first measure, on average, state standards were more focused than the CCSSM as the former required 88 cells, while the latter required 94. As Porter et al. mention, however, there was much variability among states. For example, Montana required only 27 cells, while Illinois required 157. On the second measure, the aggregated state standards required 14 cells, representing 21% of the total content, while the CCSSM was more focused as there were 31 cells, representing 58% of the total content.

The measure of alignment between state assessments and the CCSSM was .19, while the alignment between state assessments

and state curriculum frameworks was .25. Porter et al. (2010) compared the CCSSM to standards in three other high-performing countries on international assessments: Finland, Japan, and Singapore. The degree of similarity between the CCSSM and these three countries was .21, .17, and .13, respectively. Porter et al. also examined the reported practices of 1,536 teachers from 27 states and compared the degree of similarity between these practices and the CCSSM. The average alignment across this group of teachers' reported practices and the CCSSM was .22. The teachers reported a greater emphasis on memorization, conjecturing, and solving non-routine problems than the CCSSM. The overall message of the work of Porter et al. is that the CCSSM represents a significant amount of change from both the state standards with which many current teachers work, as well as the practices described by their sample of teachers.

In critiquing Porter et al.'s (2010) analysis of the CCSSM, Cobb and Jackson (2011) point out that the CCSSM define focus as a consistent attention to different aspects of important mathematical ideas. They argue that such a definition would be measured by content dimension clusters distributed across different cognitive demand levels instead of the approaches used by Porter et al. Cobb and Jackson also point out that the CCSSM were designed to be more coherent than previous standards, but analyses conducted by Porter et al. did not measure this component.

Schmidt and Houang (2012) measured focus differently from Porter et al. (2010), using what they refer to as the A+ model. This model consists of topics and grade levels in place within countries of the top achieving eighth-grade students in the Third International Mathematics and Science Study (TIMSS) that was subsequently vetted by mathematicians. Analyses conducted by Schmidt, Wang, and McKnight (2005) revealed that the standards used by these countries contained three characteristics: focus, rigor, and coherence. Consequently, they used the A+ model as a tool to measure these characteristics within the CCSSM. A score of 1000 denoted perfect alignment between a set of standards and the A+ model. State standards being used in 2009 were compared against the A+ model and ranged from 662 to 826 with an average of 762. The CCSSM received a score of 833, which denoted an 85% degree of similarity with the A+ model and a higher degree of similarity than state standards. Schmidt and Houang also examined the relationship between degree of similarity between the CCSSM and state standards and the achievement of these students on the National Assessment of Educational Progress (NAEP). After accounting for socioeconomic status and poverty, they found that students learning in states that had standards more similar to the CCSSM performed better on the NAEP.

Surveys Examining Teachers' Perceptions about the Common Core

Cogan, Schmidt, and Houang (2013) report the results of a survey administered in 2011 involving 12,000 school district curriculum directors/supervisors and teachers in the 41 states that had adopted the CCSSM at that time. They found that 70% of teachers had read the CCSSM and more than 94% supported the development of common standards. The most popular justification for this response was that common standards would provide a consistent, clear understanding of what students are expected to learn. When surveyed, the teachers were presented with mathematics topics listed in the CCSSM for their grade, and 25% of the teachers stated that they were not currently teaching these topics. The survey responses also illustrated the importance that standards documents in the United States have on mathematics classroom content, as 68% of teachers reported that state standards primarily determine the mathematics topics they teach.

After reading a sample from the CCSSM, 77% of teachers felt that the CCSSM were similar to their former state standards. Thus, while Schmidt and Houang (2012) found that the CCSSM differed from state curriculum frameworks in a number of ways, the majority of teachers sampled were not able to discern these differences. In considering what they needed to implement the CCSSM, 40% of the surveyed teachers stated that they needed new textbooks, 60% stated that they needed new online resources, and 33% indicated professional development, as teachers reported they had not received any professional development with regard to the CCSSM.

Hart Research Associates (2013) recently conducted a poll of 800 K-12 teachers with regard to the CCSS. They found that 79% were very/fairly familiar with the CCSS and that 75% approved of the development of the standards. A total of 74% of the respondents were very/fairly worried that CCSS-based assessment would occur before the standards were completely understood and aligned to classroom practice. A finding of concern to mathematics education leaders is that 39% of respondents stated that their district was somewhat or not prepared to implement the CCSS. Moreover, 72% of participants stated that their school district had provided them with some/few/no resources to implement the CCSS. Less than half of those who responded believed that they had received adequate training from their districts to implement the CCSS. The majority of respondents (54%) stated that the CCSS would result in more emphasis on testing and teaching to the test. Only 33% of surveyed teachers stated that they were very or fairly satisfied with the amount of input that they have had in developing school districts' plans for implementing the CCSS. The vast majority of teachers favored a moratorium on consequences associated with the CCSS for one year after full implementation.

EPE Research conducted a survey of readers of the *Education Week* website (2013). Their results focused on 599 K-12 teachers or instructional specialists in states that have adopted the CCSS. A total of 78% of respondents stated that they had a basic familiarity with the CCSSM. The majority (71%) of respondents had received professional development related to the CCSS. The length of teachers' CCSS professional development experiences varied from less than one day (12%) to more than five days (28%). The most common response, by 31% of the teachers, was two to three days. A total of 57% of respondents had received professional development on the CCSSM, 56% received information about the alignment between the CCSS and their former state standards, and 51% received guidance about ways to collaborate with colleagues to teach the CCSS. Only 20% of respondents received training related to state assessments aligned with the CCSS, and only 18% received professional development on how to teach the CCSS to select student groups. When asked about the quality of their CCSS professional development, the majority of respondents (66%) agreed that the quality was high. Only 20% of respondents felt very prepared to teach the CCSS to their students when considered as a group. Only 10% of teachers stated that they were very prepared to teach the CCSSM to English language learners or students with disabilities. Teachers were also asked to rank the quality of the CCSS when compared against their former state standards. Only 7% stated that their former state standards were of higher quality, 44% stated that the CCSS and former state standards were of equal quality, and 49% stated that the CCSS were of higher quality. The majority of teachers (76%) responded that they felt that the CCSS will help them improve their instruction and classroom practice, however 66% admitted that the CCSS would be incorporated into some areas of their teaching, but not others.

In sum, previous content analyses of the CCSSM show that these standards differ from the majority of previously used state standards. Three surveys examined teachers' perceptions with regard to the CCSS or the CCSSM. These studies have shown that teachers are familiar with the standards, yet they feel unprepared to teach them. These previous surveys examined teachers' perceptions with regard to fairly large grain size issues with regard to the CCSSM and have not focused on mathematics teachers or subgroups of mathematics teachers. The survey reported here explores deeply teachers' perceptions about specific components of the CCSSM, as well as a number of issues with regard to teachers' planning and use of curriculum materials in the context of the CCSSM. It also focuses on an important subgroup of teachers, middle school mathematics teachers, who lay at the intersection of primary and secondary school.

Methods

Survey questions involving Likert scale items as well as open-ended responses were developed to examine primary and secondary issues related to the CCSSM. Primary issues consisted of teachers' perceptions with regard to the CCSSM and comparisons between their past state frameworks and the CCSSM. Secondary issues consisted of teachers' planning practices, beliefs about mathematics, and professional development experiences.

Sample

The survey was administered to teachers nationwide by Market Data Retrieval (MDR) during February 2013. There were two primary sampling sources. The first sample source was MDR's online educator panel, which consisted of teachers who have agreed to participate in MDR survey research. The second source was MDR's client e-mail sample of educators. Survey invitations were randomized nationally based upon teaching state. Private and parochial schools were excluded from the process. The secondary source was used to improve the representation of middle school mathematics teachers in the sample. The order of questions was randomized for Middle School Mathematics Teachers (MSMT) during each administration of the survey.

A total of 403 teachers working in 43 of the 45 CCSSM-adopting states were surveyed. The demographics associated with these teachers are shown in Table 1. Overall, there were more teachers whose primary teaching responsibility was eighth-grade and the sample was overwhelmingly female. Previous research has shown that 84% of public school teachers in the United States are female and 16% of this same group of teachers is male (Feistritzer, 2011). Thus, the percentages in our sample of 75% for female teachers and 25% for male teachers are similar to these national figures.

Table 1
Teachers Sampled

	Gender		
Grade	Female	Male	*Total*
Sixth	80	26	***106***
Seventh	109	30	***139***
Eighth	115	43	***158***
Total	***304***	***99***	***403***

Analysis

The data analyses involving Likert-type questions consisted solely of the enumeration of different categories and the calculation of percentages. Open-ended questions were broken down into categories based upon on the content of the question. For instance, consider the following question regarding teachers' primary curriculum materials: Were these materials adopted in response to the CCSSM or prior to the CCSSM? Briefly explain. The content of the question suggests two categories: in response to the CCSSM and prior to the CCSSM. For each of the open-ended response items, some teachers supplied unclear responses that could not be categorized. Those responses were not included in the analyses reported in the following pages.

Results

Middle School Mathematics Teachers' CCSSM Perceptions

The survey asked teachers about their familiarity with the CCSSM Content Standards and Standards for Mathematics Practice. A total of 86.1% of MSMT surveyed were moderately or extensively familiar with the CCSSM Content Standards, while 87.1% of MSMT surveyed were familiar with the Standards for Mathematics Practice. When asked about the emphases of the CCSSM, 80.1% of sampled teachers felt that the CCSSM emphasized procedural/computational fluency moderately or extensively. Slightly more teachers stated that the CCSSM moderately or extensively emphasized activities in which students explore topics (88.6%). Nearly all of the teachers surveyed stated that the CCSSM moderately or extensively emphasized solving complex problems (95.8%) and mathematical communication (94.5%).

Given the novelty of the Standards for Mathematical Practice, the survey probed MSMT about their beliefs with regard to this component of the CCSSM. The majority of sampled teachers agreed or strongly agreed that the focus on mathematical practices is the biggest innovation of the CCSSM (70.5%), participating in the practices is essential for students to learn mathematics (95.3%), and that multiple Standards for Mathematical Practice can be addressed at one time (75.4%). However, teachers also agreed or strongly agreed that successful participation in the practices requires that students first understand the content (74.4%).

The survey found that the majority of MSMT agreed or strongly agreed that the CCSSM Content Standards (86.3%) and the CCSSM Standards for Mathematical Practice (87.4%) were more rigorous than their previous state standards. In addition, the majority of MSMT also agreed or strongly agreed with the following statements with regard to the CCSSM when compared to their previous state standards: represent new content (61.0%) and emphasize procedural/computational fluency (61.3%). A higher percentage of MSMT agreed or strongly agreed that the CCSSM emphasize conceptual understanding (85.6%). Survey participants were also asked if they thought the CCSSM were more computational or conceptual. The majority of MSMT (88.1%) stated that the CCSSM were moderately to heavily conceptual. The participants' responses to these questions suggested that they perceived the CCSSM to include more of a variety of different categories. We examined this hypothesis in more detail by enumerating the number of MSMT that chose the highest or second highest levels of two questions involving teachers' perceptions about CCSSM emphases and the extent to which the CCSSM will require teachers to teach for different areas. A total of 63.3% of the sample stated that the CCSSM moderately or extensively emphasized *all of the following*: procedural/computational fluency, solving of complex problems, mathematical communication, and activities in which students explore problems. In a slightly different question, 40.2% of the sample agreed that the CCSSM would require them to teach for procedural/computational fluency *and* teach more conceptually.

Teachers' Textbook Uses and the CCSSM

Due to the important role that textbooks play in teachers' practices in the United States (Banilower et al., 2013; Grouws & Smith, 2000; Tarr et al., 2008), MSMT were asked if their primary curriculum resource was adopted in response to the CCSSM or prior to the CCSSM. The responses to this survey question appear in Table 2. There were data for a total of 399 participants as four responses could not be coded because teachers provided responses that did not address the question, such as the following: During transition but our state is still in limbo (Teacher ID 31774). The majority of teachers in the sample were using textbooks that had been adopted prior to the CCSSM, and less than 20% of the teachers were using textbooks adopted as a result of the CCSSM. A total of 3% of the teachers were not sure if their textbooks had been adopted due to the CCSSM or not and 2% of MSMT in the sample had no primary textbook materials. Answers that did not fall into one of these previously described categories were labeled as "other." This category includes a mix of teachers whose districts adopted some textbooks due to the CCSSM, while still retaining others that were adopted prior to the adoption of the standards. Other teachers in this group stated that they were creating their own curriculum materials aligned with the CCSSM (as seen in the first two responses below) or locating resources online that they believed to be aligned with the CCSSM (as in the third and fourth responses below):

Teacher ID 3821
"No. We are going to have to make up our own materials for CCSSM. We have no money or grants to get what we need."

Teacher ID 7830
"We have not adopted any curriculum materials. We are not using our old books. We are writing our own lessons/materials."

Teacher ID 33346
"We are planning all of our units ourselves by looking on the Internet and finding activities."

Teacher ID 3672
"We have not been given any curriculum pacing calendar or materials correlated to the CCSS. We have been advised to find this material ourselves. No money has been spent on training or resources."

Table 2
Relationship between Primary Curriculum Materials and the CCSSM

Explanation	Frequency
Prior to CCSSM	269 (67.4%)
Due to CCSSM	80 (20.1%)
Other	30 (7.5%)
Unsure	12 (3.0%)
No Materials	8 (2.0%)
Total	***399***

MSMT in the sample were also asked about their perceptions with regard to their primary textbook materials. The greatest percentage of sampled teachers felt that their textbooks moderately or extensively emphasized computational/procedural fluency (71.5%). Despite the fact that the majority of these materials were selected prior to their state's adoption of the CCSSM, teachers felt that these materials moderately or extensively emphasized the CCSSM Content Standards (64.8%). A somewhat smaller percentage of teachers in the sample felt that their primary curriculum materials contained a moderate or extensive emphasis on CCSSM Standards for Mathematical Practice (56.8%) or student inquiry (53.4%).

MSMT were queried about the supplementary materials that they used in conjunction with their primary curriculum materials. They were asked both about supplementary materials used for remediation and practice and those used for hands-on or inquiry activities. A total of 260 sampled MSMT (64.5%) supplemented their primary mathematics curriculum for remediation and practice. The majority of teachers felt that these supplementary materials were moderately or extensively aligned with the CCSSM Content Standards (76.2%) and the CCSSM Standards for Mathematical Practice (71.5%). The MSMT in the sample stated that these supplementary materials were more aligned with computational/procedural fluency (87.3%) than with student inquiry (60.0%).

Fewer MSMT in the sample supplemented their primary mathematics curriculum for hands-on or inquiry activities than remediation or practice with a total of 188 or 46.7% of the sample. A total of 73.4% of teachers in this group stated that this type of supplementation moderately or extensively emphasized computational/procedural fluency. Teachers stated that this type of supplementation moderately or extensively emphasized the following areas: CCSSM Content Standards (86.2%); CCSSM Standards for Mathematical Practice (85.7%); and Inquiry (89.9%).

There has been a significant trend in the U.S. to move toward digital books as indicated by the fact that 22 states have changed their definition of textbooks to include digital content (Fletcher et al., 2012). In addition, across all book sales, digital books or e-books comprised only .50% of net revenue in 2006, while in 2012 this

percentage had climbed to 22.55% of net revenue (Sporkin, 2013). Accordingly, MSMT were asked about the frequency with which they use digital/electronic materials in their teaching. These results are shown in Table 3. The results in the table show that the majority of teachers in the sample are using digital materials frequently in a variety of different capacities. For instance, over two-thirds of the teachers reported using digital materials as teacher resources either once or twice a week or almost every day. The least reported use of digital resources by sampled teachers was for the supplementation of inquiry-oriented activities.

Table 3
Frequency of Teachers' Engagement with Digital/Electronic Materials

	None at all	Very rarely	Once or twice a month	Once or twice a week	Almost every day
Student text pages or worksheets	39 (9.7%)	55 (13.6%)	57 (14.1%)	140 (34.7%)	112 (27.8%)
Teacher resource materials	24 (6.0%)	30 (7.4%)	79 (19.6%)	144 (35.7%)	126 (31.3%)
Supplementary materials	27 (6.7%)	45 (11.2%)	74 (18.4%)	157 (39.0%)	100 (24.8%)
Primary curriculum resources	31 (7.7%)	69 (17.1%)	67 (16.6%)	118 (29.3%)	118 (29.3%)
Supplemental inquiry-based activities	24 (6.0%)	66 (16.4%)	104 (25.8%)	139 (34.5%)	70 (17.4%)
Practice or remediation	11 (2.7%)	47 (11.7%)	96 (23.8%)	148 (36.7%)	101 (25.1%)

Ancillary Issues with Regard to the CCSSM

As mentioned earlier, the survey also examined several kinds of teachers' beliefs about mathematics as seen in Table 4. While the majority of MSMT stated that hands-on activities are important for learning and that conceptual understanding should precede fluency with computations, teachers also stated that drill and practice are essential for developing mathematical understanding.

Table 4
Middle School Mathematics Teachers' Beliefs about Teaching Mathematics

	Strongly Disagree	Disagree	Agree	Strongly Agree
Drill and practice are essential for developing mathematical understanding	9 (2.2%)	62 (15.4%)	238 (59.1%)	94 (23.3%)
Hands-on activities are important for learning	4 (1.0%)	17 (4.2%)	211 (52.4%)	171 (42.4%)
Understanding concepts should precede fluency with computations	13 (3.2%)	79 (19.6%)	198 (49.1%)	113 (28.0%)

The survey also examined the length of professional development that MSMT received as well as the nature of that professional development. Less than 20% of the MSMT in the sample reported that they had received more than 20 hours of professional development related to the CCSSM. The nature of the professional development surveyed MSMT received is shown in Table 5. The surveyed teachers experienced professional development that did not focus exclusively on one of these actions, but seemed to address all of them. That is, the majority of teachers experienced support from their schools that emphasized student inquiry, procedural/computational fluency, new instructional approaches, and opportunities to learn about the CCSSM. In addition, the majority of teachers reported that their districts are producing documents or policies that support the implementation of the CCSSM.

Table 5
School Support Related to the CCSSM

	Not at all	Not much	Moderately	Extensively
Emphasized student inquiry	21 (5.2%)	99 (24.6%)	191 (47.4%)	92 (22.8%)
Emphasized procedural or computational fluency	14 (3.5%)	115 (28.5%)	200 (49.6%)	74 (18.4%)
Encouraged or supported you to try new instructional approaches	12 (3.0%)	78 (19.4%)	177 (43.9%)	136 (33.7%)
Provided opportunities to learn about the CCSSM	18 (4.5%)	97 (24.1%)	174 (43.2%)	114 (28.3%)
Produced documents or policies that support the implementation of the CCSM	20 (5.0%)	97 (24.1%)	174 (43.2%)	114 (28.3%)

The survey also provided sampled teachers with an opportunity to describe the nature of their district's response in preparing them for the CCSSM: If you have any other comments regarding your district's curriculum materials or professional development efforts regarding the CCSSM, please provide them below. Out of a total of 403 responses, responses from 18 teachers could not be categorized, leaving a total of 385 responses. The 385 teacher responses were placed into four different categories: no response, negative, mixed, or positive (see Table 6). A little over one-third of the responses were negative, while there were equal numbers of responses coded as mixed or positive.

Table 6
Categorizing Teachers' Open-Ended Answers to District's CCSSM Response

Category	Frequency	Sample Response
No response	170 (44.2%)	--
Negative	129 (33.5%)	I wish we had more resources so that we didn't have to make all of them ourselves. (Teacher ID: 9722)
Mixed	43 (11.2%)	We are provided multiple opportunities during the year to pull together curriculum materials on our own, but have not been provided any textbooks or workbooks yet. (Teacher ID: 37349)
Positive	43 (11.2%)	They are working hard to implement CC by training teachers now to teach others. (Teacher ID: 23031)

Table 7 depicts data on planning practices, an ancillary issue associated with the CCSSM. MSMT tend to plan by themselves, though more than half of the teachers surveyed agreed or strongly agreed with the statement that they regularly plan with colleagues. The majority of teachers did not plan with an instructional leader/coach nor did they study student work with their colleagues. MSMT reported that they did frequently discuss mathematics with their colleagues.

Table 7
Middle School Teachers' Instructional Planning Practices

	Strongly Disagree	Disagree	Agree	Strongly Agree
I plan mostly by myself	24 (6.0%)	113 (28.0%)	144 (35.7%)	122 (30.3%)
I regularly plan with colleagues	58 (14.4%)	115 (28.5%)	134 (33.3%)	96 (23.8%)
There is an instructional leader/ coach who helps me or my grade-level team plan instruction	154 (38.2%)	119 (29.5%)	99 (24.6%)	31 (7.7%)
I have adequate time to plan instruction	96 (23.8%)	153 (38.0%)	137 (34.0%)	17 (4.2%)
My colleagues and I frequently discuss mathematics	20 (5.0%)	70 (17.4%)	183 (45.4%)	130 (32.2%)
My colleagues and I regularly study student work produced in our classrooms	73 (18.1%)	135 (33.5%)	158 (39.2%)	37 (9.2%)

Discussion

Cogan, Schmidt, and Houang (2013) report that in 2011 that teachers perceived few differences between the CCSSM and their previous state standards. However, it seems that the number of teachers noting differences between the CCSSM and their former state standards has been increasing. The majority of MSMT surveyed in this study felt that the CCSSM emphasized conceptual understanding, represented new content, emphasized procedural/computational fluency, and was more rigorous when compared with their previous state standards. There are several potential explanations for this increase. First, as teachers have been expected to implement the CCSSM for several years, it would be expected that they would spend more time reading the standards and interpreting them or other documents or commentaries that describe the CCSSM. Second, the majority of MSMT completing the survey discussed in this study noted that their districts have provided opportunities for teachers to learn about the CCSSM and have produced documents or policies that support implementation of the CCSSM. Thus, these efforts seem to be working to help illuminate and underscore the differences between the CCSSM and previous state curriculum frameworks. However, almost 40% of teachers stated that the sample CCSSM standards that they examined did not indicate new content or emphasize procedural/computational fluency. Consequently, professional development may need to focus on pointing out the presence of these two areas in comparing the CCSSM with previous state curriculum frameworks.

The survey conducted by Hart Research in March 2013 reported that less than half of respondents believed that they received adequate training to implement the CCSS. In a survey conducted in October 2012, EPE Research (2013) found that 57% of the teachers they surveyed had received professional development with respect to the CCSSM. In our survey, less than 20% of surveyed MSMT received more than 20 hours of professional development during the previous year related to the CCSSM. Consequently, the dearth of CCSSM-related professional development indicated in previous surveys also appeared in our survey. Thus, teachers continue to need CCSSM-related professional development.

MSMT in our sample appeared to hold contradictory beliefs about the Standards for Mathematical Practice appearing within the CCSSM. On the one hand, they recognized the importance of these standards and that participating in these practices is essential for students to learn mathematics. On the other hand, the majority also agreed or strongly agreed that successful participation in the practices requires that students first understand mathematical content. Thus it is not clear how teachers will incorporate the Standards for Mathematical Practice within their classrooms. Will the belief that these standards are essential for learning mathematics play a bigger role in teachers' planning and implementation of lessons or will the latter belief that students need to learn mathematical content before engaging in mathematical practices dominate lessons? It is also possible that different beliefs may guide teachers' practices depending on the mathematical content for a given lesson. For instance, a lesson focused on procedures related to algebraic symbolic manipulation may be taught with few connections to standards for mathematical practice. Nonetheless, these findings suggest that MSMT can benefit from professional development that involves a variety of mathematical content while incorporating one or more standards for mathematical practices.

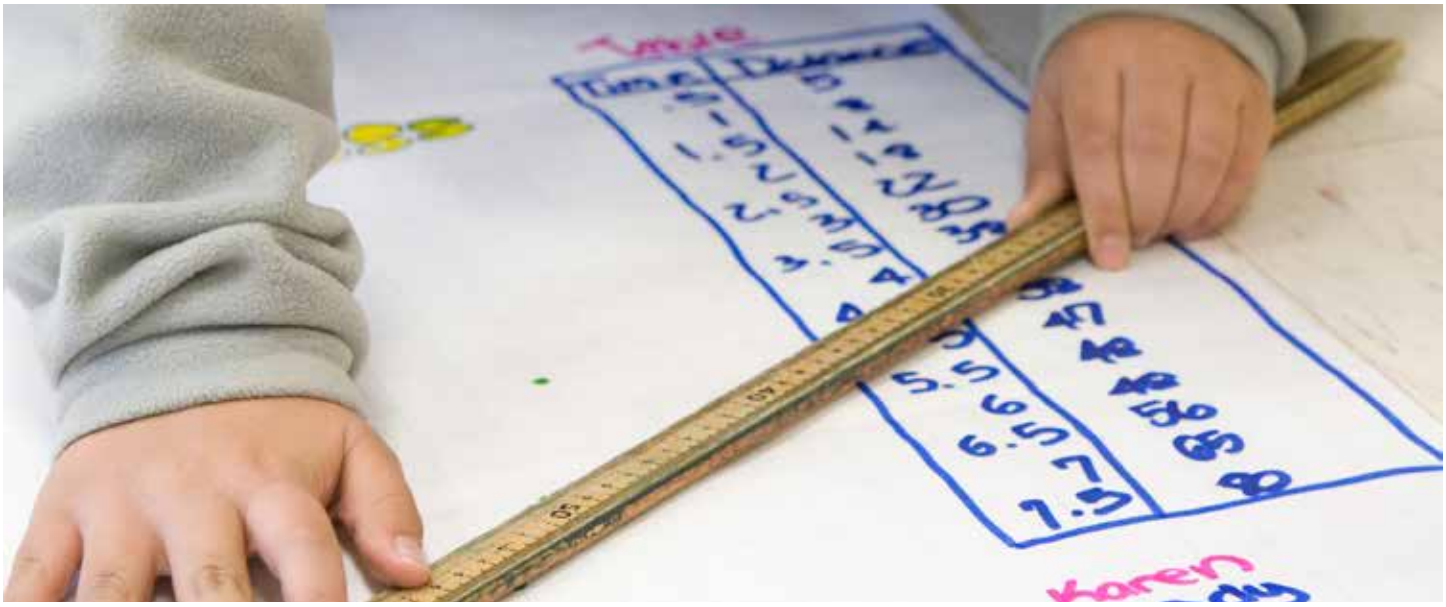
Similar to the apparent contradiction about teachers' beliefs about the role of the Practice Standards, a majority of MSMT stated that the CCSSM emphasized procedural and computational fluency *and* several inquiry-related activities, including problem solving, communication, and activities exploring topics. Moreover, over 40% stated that the CCSSM would require them to teach more for procedural and computational fluency *and* teach more for conceptual understanding. Following Leatham's (2006) call to consider teacher beliefs as sensible systems rather than as inconsistencies or contradictions, it is possible that MSMT believe that the CCSSM emphasize both procedural fluency and conceptual understanding, and that furthermore these two things are not necessarily incompatible. Another way to think about this is that many teachers feel that the CCSSM are multifaceted in their rigor, holding teachers accountable to both procedural fluency and conceptual understanding.

The results of our survey show that many teachers are using textbooks that were adopted prior to implementation of the CCSSM. This is not surprising given that new mathematics textbook adoptions occur in schools every six to eight years (Finn, Ravitch, & Whitman, 2004; Reys & Reys, 2006). In addition, when given an opportunity to voice their concerns about their district's CCSSM preparation, many teachers stated a need for curriculum materials that would help them implement the CCSSM Content Standards and Standards for Mathematical Practice. However, in absence of these materials, many teachers are turning to online resources to supplement their existing textbooks or creating their own curriculum materials. These results suggest that in absence of CCSSM-aligned curriculum materials, teachers need professional development that focuses on how to identify online materials to determine their quality and the degree to which they align with the CCSSM Content Standards and embody the CCSSM Standards for Mathematical Practice. Designing curriculum materials is a much more complex process and perhaps could be the focus of ongoing yearlong professional development.

Although MSMT reported planning mostly individually, they indicated that they spent at least some of their time planning with colleagues, and they frequently discussed mathematics with their colleagues. Research has shown the value of studying student work as a way to focus their collective inquiry (Franke et al., 1998; Kazemi & Franke, 2004; Richardson, 1990). Only half of the sampled teachers had engaged in this activity in the past year, and less than 10% reported engaging in the activity frequently. These findings suggest that teachers can benefit by professional development that provides them with tools to use student work in productive ways as well as structured support throughout the school year that provide teachers with the time to engage in this work. Our findings indicate that this form of collective inquiry should focus jointly on the CCSSM Content Standards and Standards for Mathematical Practice.

Conclusion

This survey examined MSMT perceptions with regard to a number of issues directly and indirectly connected to the CCSSM. Results suggest an increase in teachers' understandings of the CCSSM when compared with previous surveys. Also, the responses given by this sample of MSMT suggest areas in which professional development can be directed to support teachers' implementation of the CCSSM. The educational climate with regard to the CCSSM has changed since its rapid adoption by the majority of states in the United States in 2010. A number of states have sponsored or are considering legislation to withdraw from the CCSS. For instance, at the moment, Indiana recently halted the implementation of the CCSS pending a review by Indiana legislators (Stokes, 2013). Several factors have led to these repeal efforts: cost of implementation, quality of the standards, and federal interference in state educational efforts. It is difficult to predict the future of the CCSS, but at this point with assessments slated to take place during the 2014-15 school year and millions of dollars of federal aid tied to the CCSS, it is expected that the Common Core will be both a common and core aspect of the educational landscape in the foreseeable future.



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