The Impact of the Use of the Mathematics Diagnostic Testing Project in San Diego Unified School District: Teacher Interview Component

September 26, 2012

Karen Volz Bachofer, Andrew C. Zau, Julian R. Betts

EXECUTIVE SUMMARY

Since 1977, the Mathematics Diagnostic Testing Project (MDTP) has provided California teachers with free diagnostic tests designed to measure student readiness for secondary school mathematics courses. Betts, Hahn, and Zau (2011) examined the effect of voluntary and mandatory MDTP testing in San Diego Unified School District (SDUSD) from 1999-2000 through 2006-07. They found that mandatory MDTP testing was associated with gains on the California Standards Tests (CSTs) in mathematics the following year and that, if a student was given an MDTP test two years in a row, those gains persisted and strengthened slightly. The voluntary use of MDTP tests, on the other hand, had no detectable relationship to student gains in mathematics.

In a study commissioned by the California Academic Partnership Program (CAPP), Bachofer, Zau, and Betts (2012) extended the previous study by exploring the ways in which mathematics teachers in SDUSD have used MDTP tests and investigating the extent to which voluntary and mandated use of MDTP tests, varying mathematics program characteristics, instructional practice, and professional development opportunities for teachers are associated with student learning in mathematics. They found that teachers who administered the MDTP *voluntarily* were more likely to report that they reviewed test results on their own (rather than with other teachers) than teachers who administered an MDTP test under the *district mandate*. As might be expected, given the consequences associated with MDTP testing under the district mandate, teachers who reported administering an MDTP test under the *district mandate* were more likely to have discussed MDTP results with their students and distributed MDTP student letters. These findings may partially explain the Betts, Hahn, and Zau (2011) finding that voluntary use of MDTP testing had no detectable relationship to student gains in mathematics. Paradoxically, teachers who voluntarily administered an MDTP test were much more likely to indicate that the MDTP had a positive effect on the goal of teaching mathematics to their students.

The current study, also commissioned by the California Academic Partnership Program (CAPP), extends the two earlier studies by talking with SDUSD teachers who *voluntarily* administered Pre-Algebra Readiness or Algebra Readiness tests about their use of MDTP tests, and other materials and supports provided by MDTP. *For this study, voluntary MDTP testing refers to testing initiated by an individual teacher or by a particular school's mathematics department, as opposed to district-mandated testing for all students in selected mathematics courses.* Given that the use of MDTP is no longer mandated by SDUSD, one aim of this study is to examine the ways that MDTP tests, materials, and services were used by teachers whose students' gains in mathematics in past years before the case study were above versus below the median, when compared with all teachers of selected secondary mathematics courses.

The primary data collection method used in this study was teacher interviews of 20 teachers who were administered an MDTP Pre-Algebra Readiness or Algebra Readiness Test during the 2010-11 school year. Interview results were analyzed for overall trends, and then for teachers whose use of MDTP tests was above/below the median and whose students' gains in mathematics achievement were above/below the median.

The majority of teachers interviewed indicated that the decision to administer MDTP tests was made by their schools' mathematics departments. MDTP test results were most often used to ensure that students were appropriately placed in mathematics coursework and to obtain a "snapshot" or baseline of student strengths and weaknesses at the beginning of the school year. MDTP test results were also used as pre-post measures of students' skills and knowledge, to guide instruction, and to diagnose individual student learning needs.

Teachers whose students' mathematics gains had been above the median in years before the study were more likely to have administered an MDTP test only at the beginning of the school year than teachers whose students' gains were below the median. All of the teachers who reported administering MDTP tests only at the end of the school year said that they used rest results to inform placement for the next school year. Teachers who administered MDTP tests at both the beginning and the end of the school year used test results primarily for mathematics course placement and pre-post assessments of growth.

Only three teachers indicated that they had administered MDTP tests online (via MDTP's Daskala system); all three of these teachers were above the median for both MDTP test use and past student mathematics gains. Only one teacher reported using Daskala's results reporting feature to access her students' MDTP test scores.[1]

The mean *quality* rating for MDTP tests was 4.3 on a scale of 1 to 5. (Teachers were told to choose a number based with 5 being high.) Teachers appreciated the fact that MDTP tests are aligned with state mathematics standards, the fact that test results are useful in identifying students strengths and weaknesses, and the variety and rigor of test questions. We also heard suggestions for revisions and changes to the MDTP. Individual comments from teachers included the following: MDTP tests are too long, are "ready for an update" to ensure alignment with the Common Core, would benefit from the inclusion of open-ended or more complex questions, and should be revised to expand the range of difficulty to include easier and harder questions.

The mean *usefulness* rating for MDTP tests was 4.4 on a scale of 1 to 5. Several teachers remarked that MDTP results helped them shape or focus their teaching, were useful when making mathematics placement decisions for students, helped them diagnose individual students' learning needs, gave them a snapshot of each of their sections' strengths and weaknesses, and provided a measure of growth from the beginning to the end of the school year. Suggestions for improvement included access to an online version of MDTP, training focused on using test results to improve student learning, and materials to help parents understand their students' MDTP scores and how to help them improve.

The mean *impact* rating for MDTP tests was 3.8 on a scale of 1 to 5. Teachers explained their ratings by saying that MDTP results had a direct impact on their teaching, especially

---

[1] Daskala's online reporting allows teachers to access and re-sort most of their students' results and to "drill down" to view details, such as which students selected a given response to a question or a distribution of students' responses to a given test question.

with respect to diagnosing students' strengths and weaknesses, and on student placement decisions at their school. On the other hand, teachers noted challenges associated with using MDTP test results effectively, and cautioned against relying only on MDTP tests for student placement.

Interestingly, only two of the teachers interviewed had ever used any of the supplemental materials and supports provided by MDTP. Indeed, more than half of the teachers remarked that they were unaware of their availability.

A "Spend-a-Dot" activity was used to determine the relative importance that teachers assigned to the range of MDTP tests, materials, and supports. Teachers were given a list of 11 MDTP offerings and 22 adhesive dots, and then asked to distribute or "spend" the dots based on the impact that each of the offerings had on their mathematics program. Although most teachers were unaware of the full range of MDTP offerings, in almost every case they told the interviewer that they wished to spend their dots based on the impact that each offering *would have* on their mathematics program, whether they knew about – or had used – that offering or not.

Overall, hard copy diagnostic results reports for teachers received the highest mean number of dots (3.4 dots), followed by written response materials (2.8 dots) and extension activities (2.8 dots). Offerings receiving the lowest mean number of dots included regional conferences (.5 dots), the MDTP newsletter (.8 dots), and the MDTP leadership institute (.9 dots). Teachers whose MDTP test use and students' mathematics gains were above the median ranked hard copy diagnostic results reports for teachers as number one (with 4.3 dots), followed by extension activities (with 3.1 dots).

Conclusions

1. A majority of teachers participating in the study – and all of the teachers whose MDTP test use and students' mathematics gains were above the median – reported that the decision to voluntarily administer MDTP tests was made by their schools' mathematics departments. *This suggests that voluntary schoolwide administration and district-mandated administration may have a similar impact on student mathematics achievement.*

2. *A majority of teachers reported that their schools used MDTP test results to ensure that students were appropriately placed in mathematics coursework – either at the beginning of the school year to validate current placement or at the end of the school year to inform placement decisions for the following year. Given that the Betts, Hahn, and Zau (2011) study found that appropriate class placement was linked to improved student learning, the use of MDTP results (at least in part) to inform student placement might be considered good practice.*

3. All but one of the teachers whose MDTP test use and students' mathematics gains were above the median administered MDTP tests at the beginning of the school year. Teachers reported using beginning-of-the-year test results to confirm or modify course

placement – but also to get a baseline of students' individual strengths and weaknesses and to guide instruction. *This finding suggests that teachers and schools should not use MDTP results for the sole purpose of informing placement decisions. Rather, using results to identify struggling students and providing assistance early in the school year may also lead to improved student outcomes.*

4. A majority of teachers expressed keen interest in online administration of MDTP tests and results reporting, but only three teachers knew anything about Daskala, which features both. *Because many teachers have already administered district benchmarks and other assessments online – with demonstrated success – efforts to inform teachers about Daskala should be expanded. At the same time, the concerns voiced by teachers about the challenges associated with online testing (including students being more likely to guess when not doing the test on paper first, and the difficulty of setting up computers and completing the test within a single period) should be considered as Daskala evolves.*

5. Although teachers gave MDTP tests high ratings for quality and usefulness, ratings for impact were noticeably lower. *Teachers' comments indicate that the impact of MDTP testing would be greater if they had access to advice or materials that would help them know "what to do next" after reviewing students' test results. Teachers also indicated that they would appreciate resources to assist parents in helping their children with mathematics at home. These types of materials and services might prove more useful to broad range of teachers than others already offered by MDTP, but perceived by most teachers as having less impact.*

6. More than half of the teachers interviewed indicated that they were unaware that MDTP provided online testing and results reporting, written response materials, extension activities, regional conferences, a newsletter, or on-site assistance – that is, any materials and services beyond testing and reporting – and only a few teachers had ever accessed any of these materials or services. *At the same time, when asked what materials or services would be helpful to them, teachers listed many of these as highly desirable. Informing teachers and schools about the availability of MDTP materials – and providing them – is clearly the "low hanging fruit" recommendation from this study.*

7. Many teachers indicated that they thought that the MDTP tests were "ready for an update" – especially given the phase-in of the Common Core Standards. *While several teachers indicated that the tests should feature more open-ended, complex, and difficult questions, an equal number of teachers felt that the tests are too long and too hard for their students.*

1.0   BACKGROUND

Established in 1977 by the California State University (CSU) and the University of California (UC), the Mathematics Diagnostic Testing Project (MDTP) develops, distributes, scores, and reports the results of diagnostic tests designed to measure student readiness for secondary school mathematics courses ranging from Pre-Algebra to Calculus.[2] Each MDTP readiness test, which takes about 45 minutes to administer, assesses students' understanding of the specific prerequisite skills and knowledge needed to be successful in a particular mathematics course. For example the Algebra Readiness test addresses content – and reports on student strengths and weaknesses – in the following foundational areas:

- Data Analysis, Probability, and Statistics
- Decimals, Their Operations and Applications, Percent
- Simple Equations and Operations with Literal Symbols
- Exponents and Square Roots, Scientific Notation
- Fractions and Their Applications
- Measurement of Geometric Objects
- Graphical Representation
- Integers, Their Operations and Applications

MDTP tests, scoring, and reporting services are available at no cost to mathematics teachers across California, and detailed student- and classroom-level diagnostic reports are returned to teachers within a week or two of test administration. Individual results letters for students and parents are also provided. In 2009-10, MDTP introduced Daskala, a web-based system featuring online student testing and immediate teacher access to detailed student- and classroom-level results. Daskala online reporting, which includes "drill-down" capability, allows teachers to sort and view results with far greater flexibility than previously available via hard copy MDTP reports.

In addition to providing diagnostic mathematics testing and reporting, MDTP staff members assist teachers, schools, and districts in interpreting test results and using information gained to inform mathematics instruction. They also conduct regional conferences and teacher leadership institutes to help teachers use MDTP tests and other materials most effectively, publish a newsletter, and make available a range of written response materials (i.e., sample open-ended mathematics problems, commentary, solutions, and scoring rubrics) for classroom use.[3]

MDTP tests have been used widely across California since the early 1980s. During the 2010-11 school year, MDTP processed about 514,000 tests for just over 7,500 teachers, statewide. In a recently published study about the relationship between MDTP testing and

---

[2] While this study focuses on the use of MDTP tests at the middle and high school levels, half of the UC campuses, approximately two-fifths of the campuses of the CSU, and more than one-third of the campuses of the California Community Colleges also use at least one of the MDTP tests as part of the course placement process for entering students. (http://mdtp.ucsd.edu/history.shtml)

[3] Additional information can be found on the MDTP website at http://mdtp.ucsd.edu.

student outcomes in mathematics, Betts, Hahn, and Zau (2011) estimated that as many as 20 percent of middle and high school students in the state took an MDTP test during the 2006-07 school year, and that MDTP tests were administered in approximately 44 percent of California public schools with the relevant grade ranges. Since 2004-05 the most frequently administered MDTP tests have been the Algebra Readiness and Pre-Algebra Readiness Tests; in 2010-11, they accounted for about 43 percent and 20 percent of the MDTP tests given in California, respectively.[4]

Voluntary use of MDTP tests in San Diego Unified School District (SDUSD) is remarkably similar to statewide use. The full range of MDTP tests has been administered by district mathematics teachers since the early 1980s and, over time, the most frequently administered tests have been the Pre-Algebra Readiness and Algebra Readiness Tests. The number of MDTP tests administered increased dramatically after 1998-99 as a result of the testing mandate associated with a districtwide literacy and mathematics reform program.

Beginning with the 1999-2000 school year, in order to inform mathematics course placement decisions for the following year, SDUSD officials decided to mandate a spring administration of the MDTP Geometry Readiness Test to all students enrolled in Algebra. The MDTP testing window followed the California Standards Test (CST) window; for the most part, MDTP testing took place in May. Students who scored above an established cut-point on the test and earned a passing grade in Algebra (the district's criteria for having mastered key Algebra concepts) were moved on to Geometry; students who scored below the cut-point or who failed Algebra were re-enrolled in Algebra for the following year.

Mandated use of the MDTP Geometry Readiness Test was discontinued at the end of the 2002-03 school year.[5] However, the district then mandated administration of the MDTP Algebra Readiness Test (at grade 7) and MDTP Pre-Algebra Readiness Test (at grade 6) – beginning in spring 2004 and spring 2005 respectively – through the end of the 2007-08 school year.[6] (See Table 1.) Even through mandated administration of designated MDTP tests has been discontinued in SDUSD, district mathematics teachers continue to use MDTP tests on a voluntary basis. As stated above, most recent data indicate that 223 SDUSD teachers administered MDTP tests during the 2010-11 school year.[7]

---

[4] We thank state MDTP director Bruce Arnold for providing information about historical MDTP use.

[5] Beginning with the 2003-04 school year, a district-developed end-of-course Algebra exam was used for placement purposes.

[6] Voluntary use of the full range of MDTP tests by individual teachers or schools continued in SDUSD during the time period when Geometry Readiness, Algebra Readiness, and Pre-Algebra Readiness testing was mandated.

[7] In 2010-11, MDTP scored 22,535 answer sheets from 785 classes taught by 223 teachers at 49 SDUSD schools.

Table 1
SDUSD Mandated Use of MDTP Readiness Tests, by School Year

	Spring 2000	Spring 2001	Spring 2002	Spring 2003	Spring 2004	Spring 2005	Spring 2006	Spring 2007	Spring 2008	Spring 2009
Geometry	■	■	■	■						
Algebra					■	■	■	■	■	
Pre-Algebra						■	■	■	■	

1.1   Betts, Hahn, and Zau MDTP Study

Betts, Hahn, and Zau (2011) examined the effect of voluntary and mandatory MDTP testing in SDUSD on students' mathematics achievement from 1999-2000 through 2006-07. They found that mandatory MDTP testing was associated with gains on the California Standards Tests (CSTs) in mathematics the following year and that, if a student was given an MDTP test two years in a row, those gains persisted and strengthened slightly. The voluntary use of MDTP tests, on the other hand, had no detectable relationship to student gains in mathematics.

In an effort to determine why mandated MDTP testing might have had a positive effect on gains in mathematics achievement, Betts, Hahn, and Zau (2011) studied the two primary ways that SDUSD used MDTP results – assignment to summer school and mathematics course placement for the following year – to see if these mechanisms could explain student gains. They found that, on average, students who took the mandated MDTP test and had low math achievement were slightly more likely to attend summer school than similar students who had not taken a mandated test. They also found that the variation in students' prior year's mathematics test scores within a classroom fell if students had taken an end-of-year MDTP test the previous spring. In both cases, then, it appears that MDTP results really were used to inform mathematics placement decisions for SDUSD students.

Betts, Hahn, and Zau (2011) next examined whether these consequences of MDTP testing (that is, placement decisions) explained any of the positive effect of MDTP testing on students' subsequent gains in mathematics. They found that students who attended summer school in a given year had higher gains the following year, and that students who were assigned to classes with less variation among students made greater gains than they did in years when they were in classes with more heterogeneity. Summer school attendance and ability grouping – both informed by MDTP assessments of students' learning needs – appeared to promote student learning.

Although Betts, Hahn, and Zau (2011) were able to account for approximately 6 to 12 percent of the impact of mandatory MDTP testing on students' gains in mathematics, they determined that most of the effect of MDTP occurs for reasons other than summer school and appropriate classroom placement. They go on to suggest that other possible reasons might include the fact that MDTP results provide teachers with the information needed to identify and address specific student learning needs in mathematics, that mandated use of

MDTP across a particular grade level might engender active discussion among mathematics teachers about strategies to address students' learning needs, and that coordination among teachers within a school's mathematics department might result in systematic review and refinement of the school's instructional program in mathematics.

The Betts, Hahn, and Zau (2011) findings contribute significantly to the literature on the impact of diagnostic testing, and suggest that further study is needed to fully understand the mechanisms through which such testing impacts student learning gains.

1.2   Bachofer, Zau, and Betts Study

A study conducted by Bachofer, Zau and Betts (2012), commissioned by the California Academic Partnership program (CAPP), extended the Betts, Hahn, and Zau (2011) work by examining MDTP use in SDUSD – from voluntary and mandated administrations during the 1999-2000 through 2010-11 school years. An online survey was used to capture teachers' descriptions of the ways they used MDTP, their mathematics programs, their instructional practice, and their professional development experiences. Individual teachers' survey responses, together with a measure of their students' learning gains in mathematics, were used to explore the relationships among MDTP use, mathematics program characteristics, instructional practice, professional development, and student outcomes in mathematics.

Even though the stated purpose for *district-mandated administration* of MDTP readiness tests was to inform placement decisions for the following school year, survey results indicated that most teachers used MDTP results much more broadly – most notably, to identify students' strengths and weaknesses (and to discuss those strengths and weaknesses with students) and to modify instruction to address areas of need. Teachers' review of MDTP results was almost always a solitary endeavor; teachers reported that they seldom discussed MDTP results with other teachers or school administrators.   Similarly, teacher responses suggested that schools rarely used MDTP results to modify mathematics programs or pedagogy. Nearly half of the teachers responding to the survey indicated that the impact of the MDTP was positive, which was surprising, given the "top down" nature of the district mandate.

Teachers who administered the MDTP *voluntarily* were less likely to report that they reviewed results to determine students' strengths and weaknesses than teachers who administered an MDTP test under the *district mandate.* As might be expected, given the consequences associated with MDTP testing under the district mandate, teachers who reported voluntarily administering an MDTP test were less likely to have discussed MDTP results with their students or distributed MDTP student letters. These findings may partially explain the Betts, Hahn, and Zau (2011) finding that voluntary use of MDTP testing had no detectable relationship to student gains in mathematics. Paradoxically, teachers who voluntarily administered an MDTP test were much more likely to indicate that the MDTP had a positive effect on the goal of teaching mathematics to their students.

1.3   Current Study

Even though SDUSD no longer mandates the administration of MDTP readiness tests, the tests are still widely used across the district. During the 2010-11 school year, more than 200 mathematics teachers voluntarily administered MDTP tests to their students. *For this study, voluntary MDTP testing refers to testing initiated by an individual teacher or by a particular school's mathematics department, as opposed to district-mandated testing for all students in selected mathematics courses.* The current study uses teacher interviews to gather information about the ways teachers use a range of MDTP tests, materials, and supports, and to solicit their opinions about the quality, usefulness, and impact of these MDTP tests, materials, and services.

This paper is presented in six sections, including this background section (Section 1.0). Section 2.0 (Mathematics Diagnostic Testing Project Study) describes the overall three-part study of the MDTP commissioned by the CAPP, as well as the methodology for this teacher interview component of the study. Section 3.0 (Data) describes the teacher interview data and the student longitudinal database used to conduct this study. Section 4.0 (Results) presents findings from the teacher interviews related to the use of MDTP readiness tests and other MDTP materials and resources. Finally, Section 5.0 provides a Summary of Findings and Section 6.0 provides Conclusions.

2.0   MATHEMATICS DIAGNOSTIC TESTING PROJECT (MDTP) STUDY

2.1   A Three-Part Study of the MDTP

This study is the third part of a three-part research project aimed at examining the ways in which mathematics teachers use or have used Mathematics Diagnostic Testing Project (MDTP) tests, materials, and services in San Diego Unified School District (SDUSD) and determining the extent to which MDTP use, mathematics program characteristics, and instructional practice in the district are associated with student learning outcomes in mathematics.

Part One of the study, which focused on the relationship between mandatory and voluntary use of MDTP testing in SDUSD and student learning outcomes in mathematics, is described in *Betts, Hahn, and Zau Study*, above. Part Two of the study, which explored the ways teachers have used MDTP readiness tests and gathered descriptions about teachers' mathematics programs, instructional practice, and professional development experiences, is described in *Bachofer, Zau, and Betts Study*, above. Part Three, the current study, extends the two previous studies by examining teachers' voluntary use of MDTP tests, materials, and services.

2.2   Questions Guiding the Study

Core study questions for the overall study are:

Characteristics of MDTP and the District-Mandated/Voluntary Use of MDTP Tests in SDUSD
(Addressed in Parts Two and Three)
1. What is MDTP and how have MDTP tests and related resources been used in SDUSD?
2. How do teachers characterize their use of MDTP tests and related resources?
3. How do teachers characterize the quality and usefulness of MDTP tests and related resources?
4. Do teachers report changing course content or emphasis, instructional practice, or student grouping as a result of MDTP use?
5. What suggestions do teachers have for improving the usefulness of MDTP assessments and related resources?
6. To what extent do findings vary by course, mandatory v. voluntary MDTP use, or student, teacher, or school characteristics?

Characteristics of Mathematics Programs and Instructional Practice in SDUSD
(Addressed in Parts Two and Three)
7. How do teachers characterize their mathematics program, instructional practice, and professional development in mathematics?
8. How is instructional time used in mathematics classrooms? What types of activities do students engage in during mathematics instruction?
9. What topics have been emphasized in professional development activities for SDUSD teachers in recent years? How frequently have teachers engaged in different types of professional development?
10. To what extent do findings vary by course, mandatory v. voluntary MDTP use, or student, teacher, or school characteristics?

Student Outcomes, MDTP Use, and Mathematics Program Characteristics
(Addressed in Parts One, Two, and Three)
11. To what extent are student learning outcomes affected by mandatory and voluntary MDTP use and mathematics program characteristics?

2.3   The Current Study: Teacher Interviews

The primary data collection method used in this study was teacher interviews with teachers who had administered the Pre-Algebra Readiness or Algebra Readiness MDTP test during the 2010-11 academic year. The interview consisted of approximately 20 questions designed to gather information about teachers' voluntary use of MDTP tests, materials, and services; their opinions about the quality, usefulness, and impact of those tests, materials, and services; and their ratings of the impact that the tests, materials, and services have had on the success of their mathematics programs. (See the Appendix for a copy of the teacher interview protocol.) MDTP administrative records were used to determine the number of MDTP tests administered by each teacher; district administrative records were used to calculate a measure of each teacher's students' gains in mathematics **in years before the**

present case study was conducted. (See section 3.3 for an explanation of how above/below median student gain was calculated.)

3.0   DATA

3.1   Teacher Interview Data

MDTP records indicate that 75 middle and high school teachers administered the Pre-Algebra Readiness or Algebra Readiness test in SDUSD, during the 2010-11 school year. Researchers were able to identify 70 of those teachers in the SDUSD database; 63 of the 70 teachers were still employed by the district and assigned to a mathematics classroom when the research project began during the 2011-12 school year.

These 63 teachers were ranked from high to low on two dimensions – the number of MDTP tests they administered during 2010-11 (from a high of 321 to a low of 4) and their students' mean mathematics achievement gains in years prior to the current study, based on California Standards Test (CST) data. (See Section 3.3, below, for a description of how above/below median student achievement gains were calculated.) Using these data, teachers were then assigned to one of four groups:

- Group 1: MDTP test use and student gains above the median (17 teachers),
- Group 2: MDTP test use below and mean student gain above the median (22 teachers),
- Group 3: MDTP test use and mean student gain below the median (9 teachers), and
- Group 4: MDTP test use above and mean student gain below the median (15 teachers).

The researchers' goal was to interview at least 6 teachers from each group, a total of 24 teachers; teachers in each group were randomized and invited to participate in the study. Ultimately, 20 teachers agreed to be interviewed – 7 in the above the median use, above the median gain group (41 percent of Group 1 teachers invited); 5 in the below the median use, above the median gain group (23 percent of Group 2 teachers invited); 2 in the below the median use, below the median gain group (22 percent of Group 3 teachers invited), and 6 in the above the median use, below the median gain group (40 percent of Group 4 teachers invited). Interviews, which took place between April 23 and June 20, 2012, were conducted at school sites during teachers' prep periods or outside school hours. Each teacher received a $25 gift card for agreeing to be interviewed.

Teacher responses gathered during interview sessions were recorded, transcribed, and coded. Responses to questions about the quality, usefulness, and impact of MDTP tests, materials, and supports included yes/no values (e.g., have used/have not used a particular MDTP test, material, or service), 1-5 values (e.g., low to high rating for the quality of a particular MDTP test, material, or service), as well as teachers' descriptions of their use of MDTP tests, materials, and services, as well as explanations for their ratings. Teacher responses to questions about their perceptions of the relative impact of each of the MDTP

tests, materials, and supports on the success of their mathematics programs (i.e., Spend-a-Dot activity[8]) were assigned a numerical value from 0 to 22.

3.2   Student Longitudinal Database

SanDERA researchers have compiled a longitudinal dataset that includes administrative records for both students and teachers. The student data contains demographic characteristics, academic records, state test results, English learner status, special education status, school characteristics, and teacher characteristics. Academic records are linked to individual teachers in order to determine anticipated gains in scores by classroom. For this report, student records from 2002 to 2010 were used.

3.3   Calculation of Above/Below Median Gains in Student Mathematics Achievement

To estimate mathematics teacher value-added, we estimated models of changes in student achievement, using student test scores from grade 6 through 11, as tested in spring 2002 through spring 2010. Within each mathematics CST test we converted test scores to Z-scores (by subtracting the districtwide mean for the grade and year and test and dividing by the corresponding standard deviation).

We then regressed individual students' changes from one year to the next, calculated from the Z-scores just described, on a set of mathematics teacher dummy variables, student race/ethnicity dummy variables, dummies for student gender, English Learner status, dummies for parental education, the type of mathematics CST test taken, grade, school year, school identity code, and the percentage of students at the school eligible for meal assistance in each year.

We subsequently ranked all district mathematics teachers by their coefficients, and divided the sample into two parts. Teachers whose students' gains in mathematics achievement are in the top half of the distribution are identified as "above the median" teachers; teachers students' mathematics gains are in the bottom half of the distribution are identified as "below the median" teachers. Rankings (i.e., above/below median student gain) for teachers who participated in this study were based on their rankings within this larger context (i.e., all teachers), not on the rankings of the teachers in the invited to participate in the study (i.e., the 63 teachers in the interview "pool").

---

[8] The Spend-a-Dot activity was used to capture interviewees' opinions about the relative importance of a range of MDTP materials and services. Each interviewee was given 22 adhesive dots and asked to distribute ("spend") them among the 11 types of materials and services listed, based upon the perceived importance of each element to the success of their mathematics programs. Materials and services included: Hard Copy MDTP Tests, Hard Copy Diagnostic Results for Teachers, Online MDTP Tests, Online Diagnostic Reporting for Teachers (Daskala), Individual Results Letters for Students and Parents, Written Response Materials, Extension Activities, Regional Conferences, MDTP-Provided Meetings at Schools, MDTP Newsletter, MDTP Teacher Leadership Institutes.

It is important to bear in mind that later in the report when we discuss teachers whose students gains in mathematics achievement were above or below the median, that we cannot make any claims that use or non-use of the MDTP was in any way causally associated with these gains. Rather, our goal is to look for variations in MDTP use between teachers whose students historically gained above or below the median.

3.4   Limitations of the Study: Small Numbers

Please note that findings from the interview component of the study should be interpreted with caution, given the small number of teachers who agreed to participate. When reporting responses for groups of fewer than 10 (e.g., teachers who administered MDTP tests only at the beginning of the year, where n=6), results have not been displayed in terms of percentages. The small number of participants also means that it is not appropriate to report differences between groups of teachers in terms of statistical significance. This limitation should not diminish the important findings that can be derived from teachers' rich and detailed responses to interview questions.

4.0   RESULTS

4.1   Interviewees

Twenty teachers agreed to be interviewed as part of the study. Table 2 provides the demographic characteristics of interviewees and of all SDUSD mathematics teachers who administered the MDTP Pre-Algebra Readiness or Algebra Readiness test during the 2010-11 school year.

Table 2

Demographic Characteristics of Interviewees and All Mathematics Teachers Who Administered an MDTP Pre-Algebra Readiness or Algebra Readiness Test in 2010-11

Characteristic	Percent of Interviewees n=20	Percent of All Mathematics Teachers who Administered Selected MDTP Tests n=63
Ethnicity		
African American	10	5
Asian	10	11
Hispanic	5	6
White	75	73
Other	0	5
Gender		
Female	80	69
Male	20	31
Teaching Experience[9]		
Less than 10 Years	26	36
10 to 20 Years	58	38
More than 20 Years	16	26
Mathematics Degree Earned		
Bachelors	18	21
Masters/Ph.D.	2	0
Mathematics Teaching Credential		
Elementary	70	66
Mathematics	20	26
Mathematics Supplemental	30	19
MDTP Use		
Above the Median	65	51
Below Median	35	49
Student Gain		
Above the Median	60	62
Below the Median	40	38

While teachers who participated in the interview component of the study were demographically similar to all mathematics teachers who administered the MDTP Pre-Algebra Readiness or Algebra Readiness test during the 2010-11 school year, teachers completing the survey were more likely to be female and to have a supplemental mathematics credential. Interviewees' MDTP use was more likely to be higher than average; student gain was similar for interviewees and teachers, overall.

---

[9] Mean years of teaching experience for the 20 interviewees was 13.8; for all teachers who administered the Pre-Algebra Readiness and Algebra Readiness test in 2010-11, teachers, it was 14.9.

Teachers who administered the Pre-Algebra Readiness Test were most often assigned to sixth-grade mathematics and Pre-Algebra/Algebra Readiness[10] classrooms (with 92 percent of Pre-Algebra Readiness tests administered in those two courses, 46 percent each). Teachers who administered the Algebra Readiness Test were most often assigned to Pre-Algebra/Algebra Readiness classrooms (with 50 percent of the Algebra Readiness Tests administered in these courses); teachers of sixth-grade mathematics and Algebra accounted for the other 50 percent (with 25 percent each).

4.2   MDTP Tests and Results Reporting

This section of the interview asked teachers to describe the ways that they voluntarily used MDTP testing and results reporting during the 2010-11 academic year, to recall differences between this voluntary MDTP test administration and previous district-mandated administration, if applicable, and to describe their experiences with online versions of MDTP testing and results reporting. [Note: The term "voluntary" in this study refers to MDTP testing initiated by an individual teacher or by an entire mathematics department – as opposed to district-mandated administration.]

4.2.1   *Voluntary Use of Pre-Algebra Readiness and Algebra Readiness Tests*

All teachers participating in this study administered the Pre-Algebra Readiness or Algebra Readiness test during the 2010-11 school year. Fourteen of 20 teachers (70 percent) indicated that the decision to administer MDTP tests was made by their schools' mathematics departments, and that every teacher at the school teaching targeted courses administered the test. Teachers whose MDTP use was above the median and teachers whose students' gains in mathematics were above the median were more likely to indicate that the decision to administer the MDTP schoolwide was made by their mathematics departments. All of the teachers in the above the median use/above the median student gain group (Group 1) indicated that their mathematics departments had decided upon schoolwide use.

The schoowide decision to use MDTP testing (usually, in conjunction with other measures) was most often made to facilitate appropriate student placement in mathematics courses. Two teachers explained their schools' use of MDTP results at the beginning and end of the school year:

---

[10] According to the SDUSD *Course of Study, K-12*, Algebra Readiness is an eighth-grade course designed for students who need additional time and support to build the foundational skills necessary for success in algebra. The course reinforces arithmetic and number skills in the context of meaningful problems, and emphasizes the following topics: probability; ratio, proportion, and percentages; variables and pattern; linear relationships; exponential relationships, Pythagorean theorem, and measurement in three dimensions. It also focuses on mathematical reasoning and communication.

"Master schedule decisions are made by the department, so we set a testing window… at the beginning of the school year… so we can make sure that our placement is accurate. We have a placement matrix and the MDTP is one component of the matrix – one of four."

"For our sixth and seventh graders, we use [MDTP test results] to make sure we are placing students in the right course when we can. If we find a student who is struggling with lots of skills, they may be recommended – instead of the Algebra course or the Pre-Algebra – for Algebra Readiness [the next year]. We use MDTP in conjunction with CST scores, class grades, and teacher recommendation as sort of a composite view of the student to help us figure out where to put them to make them most efficient."

When asked whether they used MDTP tests in all of their courses – and in all sections of their courses – every teacher said that they did so. The most common reasons they gave for using MDTP readiness tests in all courses and sections of courses included mathematics course placement (35 percent) and identifying a "starting point" for classes at the beginning of the school year (35 percent). One teacher remarked that her school's mathematics department administered MDTP tests because they "wanted to know a baseline of where the students were [at the beginning of the school year], especially for sixth grade, [to make sure they were] appropriately placed" and "also for the seventh grade advanced and regular [students] to see if we had appropriately judged their placement." Another teacher stated that the MDTP gave her school's mathematics department a common mechanism to assess students' skills and knowledge at the beginning of the school year, saying, "When I came to the school, the other teachers were unfamiliar with [the MDTP], so nobody was doing any kind of intake evaluation. Some teachers were using the textbook introductory evaluation, but there was just no consensus. Some teachers weren't doing anything."

Other reasons for administering an MDTP test in all courses and sections of courses included obtaining useful pre-post measures of students' growth in mathematics to inform the school, the teacher, and the students, guiding instruction for the current school year, and diagnosing individual student learning needs, particularly at the beginning of the school year. The following quotes illustrate:

"At the end of the year, kids want to know, 'How did I do?' …I can show them, 'You have learned, you have learned – look how your test scores have grown! It [was] worth it, all of the homework and struggles and here you are ready to go on to next year and your next teacher.'"

"I look to see where the class as a whole is very weak and… hit those [areas] where they are very weak first and… slow my teaching down when I know the whole class doesn't get a concept as opposed to 'Well they scored really well here, so I don't have to stress that as much.'"

Overall, 80 percent of the teachers interviewed said that they administered an MDTP test at the beginning of the school year and 70 percent said that they administered an MDTP test at the end of the school year. Thirty percent of teachers interviewed reported that they administered an MDTP test only at the beginning of the school year, 20 percent of teachers reported end-of-year administration only, and 50 percent reported that they administered an MDTP test at both the beginning and at the end of the school year.

Teachers whose students' mathematics gains were above the median in past years were more likely to have administered an MDTP test only at the beginning of the school year (5 of 12 teachers) than teachers whose students' gains were below the median (1 of 8 teachers).

When asked why they chose a particular timeframe to administer an MDTP test, teachers who reported giving an MDTP test *only at the beginning of the school year* said that they used test results to give them a baseline of students' strengths and weaknesses (4 of 6 teachers), to confirm or modify course placement as the school year began (4 of 6 teachers), or to guide instruction (3 of 6 teachers). Several teachers said that they used test results to shape the first few weeks of instruction. One Algebra teacher explained that "a lot of the first two chapters of the Algebra textbook goes over the Pre-Algebra textbook, so I wanted to know what I could skip through or go quickly through or what I needed to spend more time on." A Pre-Algebra teacher said that she…

> *"…used the results to get a picture of each of my periods. [The MDTP] tells weaknesses and strengths so I could get a picture at the beginning of the year of how far I needed to get with the kids. Some of the students' entire sheets were 'needs substantial review' in all of the topics and then a kid sitting next to them would have a page that said 'doing great' in all the topics. I could judge how fast or slow I could move through topics on average for each class."*

Other teachers used beginning-of-the-year MDTP results to identify and address specific areas of strength and weakness in order to provide supplemental instruction or to group students for instruction, especially at the beginning of the school year. A teacher explained how she used results in her Algebra classroom –

> *"I look at it to see, especially for my advanced class, if they are strong or weak. If they are weak, I might suggest that they do packets of fractions or whatever it might be. I sit with them one on one and go over it [the student letter] and I have the parents sign it. I highlight it that 'this concerns me here' that you don't know fractions and there is a packet over there for you to get caught up or review fractions."*

All of the teachers who administered the test *only at the end of the school year* said that they used test results to inform placement decisions for the next school year – mostly to determine if students would be placed in advanced or regular versions of particular mathematics courses. In several cases, the end-of-year tests were administered to all students at a "sending" school at request of a different school that would be "receiving" those students the following school year. At one school, students were given two MDTP

tests at the end of Grade 6 – Pre-Algebra Readiness and Algebra Readiness – to determine whether they would be placed in Pre-Algebra or skip ahead to Algebra in Grade 7. As might be expected, teachers who administered the MDTP only at the end of the school year did not report using test results to determine student growth, identify students' strengths and weaknesses, or to guide instruction.

Ten teachers reported that they administered an MDTP test *at the beginning and at the end of the school year*. All 10 of these teachers said that they used MDTP results for course placement. In many cases, teachers said that they chose this timeframe so that they could determine student growth during the course of the school year (8 of 10 teachers) and, in some cases, address areas of weakness (6 of 10 teachers) and guide instruction (6 of 10 teachers) at the beginning of the school year, during the school year, and at the end of the school year.

> Beginning of Year: *"I also use the results for diagnostic purposes. It helps with my instruction, too. I'm pretty darn sure that most of my sixth graders are struggling with fractions, decimals, and percents, and that is borne out by the results of the test. It guides my instruction."*

> During Year: *"Usually, I make a copy of the [student letters] and give them to the students at an individual conference with them and say, 'These are the areas we find that you are having some issues with.' During the school year we have several online programs that we use to address the issues that are identified with the MDTP. Hopefully, all of that intervention… is going to help them address those skills that they may be lacking."*

> End of Year: *"I administer it at the very beginning [of the school year], like day 2 or day 3. I administer it again right before the CST. I look to see if the classes have grown in all of the sub-areas and if they haven't, what I do is spiral what they missed into the topics I'm working on so they'll be ready."*

Table 3 summarizes the ways that teachers used MDTP results, by administration timeframe (i.e., beginning of the year only, end of the year only, both beginning and end of year).

Table 3
Use of MDTP Results, by Administration Timeframe

	Percent Beginning of Year Only n=6	Percent End of Year Only n=4	Percent Both Beginning and End of Year n=10
Pre-Post Assessment of Growth	0	0	80
Mathematics Course Placement	67	100	100
Baseline/Snapshot for Class	67	25	50
Identify Strengths and Weaknesses to Provide Support	67	0	60
Guide Instruction	50	0	60

Forty percent of interviewees indicated that they had administered an MDTP test both voluntarily and as part of the districtwide mandate. When asked if there were differences between voluntary and mandatory administration, teachers remarked that the timing of the district-mandated testing was poor, that results from the mandatory administration were too slow to arrive.

> *"I'm wondering in the beginning if we even got the results back. There were a couple times when we gave out the results before the end of the school year. Sometimes we got the results back when we returned to school in the fall so it was kind of like 'What was the point?'"*

They also mentioned that it was difficult to get teacher buy-in for the mandated administration, and that using the MDTP in a pre-post format is a better use of the assessment than an end-of-year test used for placement purposes. One teacher made the following comment with respect to teacher buy-in.

> *"Maybe if it is mandatory it is just one more test you are giving. When it is voluntary you are giving it for a purpose and you know what it is. You are giving it to see how to guide your students, their strengths and weaknesses. When it's mandatory, it's just handed to you…'here you go, take this test.' I don't know why."*

Three of the 20 teachers participating in the study (15 percent) indicated that they had administered the online (Daskala) version of the MDTP; all three of these teachers were in the above the median use/above the median student gain group (Group 1), and were assigned to Pre-Algebra/Algebra Readiness courses. In every case their use of Daskala was made possible by funding associated with an Enhancing Education through Technology (EETT) grant received by SDUSD. Only one teacher reported that she had used Daskala's online test results reporting tool, which allows teachers to sort/re-sort test data and "drill down" to view details, such as which students selected a given response to a question or displaying each question and the distribution of responses, by class. Several teachers indicated that they had never heard of Daskala, which was somewhat surprising, since an online version of MDTP was on many teachers' "wish lists."

Those teachers who had used Daskala reported only a few concerns associated with test administration. First, they would prefer that students take the paper-pencil test first and then enter their answers into the computer, in order to minimize the common practice of students guessing the answer. Second, they maintain that there is not enough time in a class period to take the online test, given the logistical challenges associated with getting computers set up and stored away. All three teachers provided detailed feedback on their use of Daskala, some of which is provided below.

> *"It was smooth for me, no challenges. I liked that [students] could use it like a paper version and flip back and forth between questions. Some of the [online] quizzes I give, once they pick an answer it is locked in and they can't go back and they can't skip. So it was nice that they had the option, although whether or not they used it was up to them. I think that for lower [achieving] students to have only one question on the page at a time is a huge advantage, so they weren't as distracted by having a whole page of different pictures and different options. For special education kids, especially, that's big... it gives them a chance more than a regular test would."*

> *"I would prefer the paper version of the test. I think the kids prefer [a hard copy of the test] in front of them and being able to manipulate paper/pencil. I wouldn't even mind if [students] did it that way and then took that and put their answers online after the fact. Maybe not doing it on a Scantron, but sitting in a room with paper and pencil and going to the lab real quick to just enter [their answers online]. I think for some of them, when it's not paper in front of them they have a tendency to just a, b, c, d – and just not even attempt it."*

> *"All of our math teachers are open to doing it online. I think the timeframe is a problem. Because it is such a long test (I know it says on the booklet the estimated time is 45 minutes), but you know the time it takes to pass everything out. And the online test, since it happens so early in the year and it's the first time you power on the laptops when coming back after the summer, it takes 15 minutes for the kids to power on and log on and that wastes a lot of class time. And then you have to save about 15 minutes at the end of the period for them to shut down and put the laptops away. So just the timeframe with adding the setup and cleanup time with the laptops reduces the amount of time they get to spend on the MDTP test, itself. And another thing, mostly with non-advanced students, if it's online they don't take the time to try to work the problems out on scratch paper. Even though I passed out scratch paper, they still just guess. Even some of my advanced students will go through the whole MDTP without doing any scratchwork and just guess on the ones they didn't know automatically. Or they try to do it in their heads instead of on scratch paper."*

Although 85 percent of interviewees had never administered an MDTP test via Daskala, many teachers wished to share their opinions about online testing, in general, based on their experiences with districtwide benchmarks or other assessments delivered online. Like Daskala users, many teachers felt that having students complete a paper-pencil

version of the test before entering answers onto the online test results in better student outcomes.

> *"One drawback [to online testing] is the kids just click, click, click and they're done. What I've done, because I have been doing online testing for the past couple years, is that they always get a paper version and do that first and then we go on to the online test and they enter their answers."*

> *"I've actually done some personal studies of my own where I've given the students a paper-pencil test… and printed it out and given it to the students on paper and then given it online and we find, other teachers find this too, that there are consistently lower scores from students taking tests on the computer. It's difficult to get a student to work something out anyway, and when you give them one of these [points to mouse] this becomes a tool for guessing. A mouse is absolutely a vehicle for guessing. So, going into the online testing, [our math department] decided that we were going to actually give the paper version of the test, and then let the students… log on and enter in their answers. We didn't let the students test on the machine. That created a timing component where it couldn't be done in one day. I don't think this is on anybody's radar screen."*

Like Daskala users, several teachers said that they liked the idea of online testing, but worry that challenges with technology would be a drawback. For example, one teacher recounted that:

> *"A week ago I had 5 computers die… The batteries are dying and so they don't make it through the period. With the test, you don't want to lose everything. When the computers aren't working or if your network is down or extremely slow it might take 10 minutes to get started. If you only have a 50-55 minute period then…[you run out of time]."*

A few teachers noted that, when using online testing, students do not have the opportunity to use/demonstrate important problem-solving strategies they have learned during mathematics instruction and that, as a result, teachers are not able to see where students "went wrong." And finally, the cost of Daskala was mentioned as a concern by a number of teachers. As one teacher explained:

> *"I was debating [using Daskala]. I think it was $1 per kid, and I was actually thinking about paying for it myself because all of my tests are online… I do everything online. I would say that 95 percent of the work kids do in my class is online. I love it. Absolutely love it."*

On average, teachers participating in the study have been voluntarily administering MDTP tests for nearly seven years. Fifty-five percent of teachers indicated that are differences between their "first use" and current use of MDTP tests and results reporting. When describing these differences, teachers most often said that they "actually use" MDTP results

now, but that they didn't when they first administered the tests (35 percent) and that they now use MDTP results to guide instruction (20 percent). Two teachers explain:

> *"I used to give the test, give the kids back their results, and then set the results aside… as did every other teacher. I didn't understand what [the data] meant and I never took the time to read through the results. It wasn't until I started that process [National Board for Professional Teaching Standards] that I really understood how to use the data to guide my teaching. I took me awhile to figure out how to use the reports, and then I thought, 'Wow, I should have been using this a long time ago.' Once I learned how to use the information, my kids started to learn more. Some of them are jumping one or two [CST performance] levels."*

> *"There is a big difference. I was told to use it before and I didn't do anything with it. And then, after I'd been teaching a couple years and I wasn't just getting my feet wet – and I was understanding what I was doing and starting to group kids based on ability and differentiate instruction – I was looking at the test, like 'I can use the test for some of this stuff.' So I was kind of like a fiddler in the beginning, because I didn't do anything with the results. And then when they stopped giving it [mandated administration], I saw the value of it I kept doing it and it was free."*

A few teachers indicated that they now share MDTP results with students. One sixth-grade mathematics teacher offered a clear example of that shift in practice:

> *"When I first gave [the MDTP] I never really shared the results with the students, and now we give the students a copy of how well they did and we discuss it with them. So that they can see that when we're talking about fractions, per se, they know that this is an area that they really need to focus on. That's the only thing I've really changed, giving the students feedback."*

On the other hand, a few teachers urged caution when sharing MDTP test results with students and their parents. For example, one teacher remarked that –

> *"I don't value the results letters to the parents, because I know that [the letters don't get] to the parents or [the parents] don't interpret it well. The kids say 'Well, I'm dumb' or 'I don't get this, I'm stupid.' It kind of shoots itself in the foot. Whereas, it is great for a teacher to know where a student is low so that [teachers] can show [a student] 'You need to review this' or 'Work on this or that.' When you give [the results letters] to the students and parents, it has a backfiring effect. And then a kid who scores high thinks 'I don't have to work this year.' You can get the low ones to cut off and the high ones to cut off. But, it's useful to the teacher."*

And finally, several teachers indicated that their current use of MDTP data would improve if they had more planning time, access to training or ongoing support focused on accessing and using MDTP data, knew "what to do next" after identifying students' strengths and weaknesses, and schoolwide meetings to discuss MDTP results and ways to support

students' learning needs. An Algebra teacher explained how she would improve her school's use of MDTP results.

> *"It would be good to take a day in October to go over the results other than just for placing students. My department has talked about grouping kids by grade level to maybe have a support person do an enrichment activity with the kids who already get it, and a certificated teacher do remedial, and someone else do a kind of a medium level. I would share the other math teachers' 7th grade kids and we would do a small group split each period so that we could use the leveling system. So 'I know you are weak on this topic, let's practice it more; I know you are strong on this topic, let's do an enrichment activity.'"*

4.2.2   Ratings of Test Quality, Usefulness, and Impact

Interviewees were asked to rate the quality, usefulness, and impact of MDTP tests, using a 1-5 scale, with 5 being high and one being low. They were then asked to explain their ratings and to offer any suggestions for improving the quality, usefulness, and impact of the tests.

Quality

The mean quality rating for MDTP tests was 4.3 out of 5, with all interviewees rating the quality of MDTP tests either "4" or "5." Teachers whose MDTP use was above the median rated the quality of MDTP tests slightly lower than teachers whose MDTP use was below the median (4.2 v. 4.4). Similarly, teachers whose students' mathematics gains were above the median the rated the quality of MDTP tests slightly lower than teachers whose students' gains were below the median (4.2 v. 4.5).

When asked to explain their ratings, six teachers remarked that they appreciated the fact that MDTP tests are aligned with the state's mathematics standards, and five teachers said that the MDTP test was a good indicator of students' readiness for a given mathematics course. One teacher said that the alignment with "what these kids need to know" made the MDTP a valuable part of the placement process used at her school.

> *"Because we consistently use it as part of our placement matrix, we find that we get pretty accurate results off of it. The kids who are performing extremely well on that test and get placed into our advanced seminar classes tend to perform pretty well in the class. The kids that suffer on that test tend to be suffering in their class, also."*

Other reasons given for favorable ratings include the ability of the tests to identify students' strengths and weaknesses, especially at the beginning of the school year,

> *"It shows me and the students the topics we are going to do for the year. I tell the students that this means that you have a lot to learn this year. It kind of gives them a goal of 'I should know this'… showing what you need to learn. If it says you need review, we need to review those topics. It's a motivator for some students."*

and the variety and rigor of questions on the tests. For example, one Pre-Algebra teacher described the questions on the Algebra Readiness test, saying:

> *"There's a lot of real basics here, like converting fractions, and percent, and finding the percent of increase, and $a^2+b^2=c^2$. If a student has been paying attention in the 7th grade they ought to be able to do an awful lot of this if they have any math connections going on. [There is] probability and there are a lot of charts and graphs in there – students ought be able to read charts and graphs. So I think a lot of these questions are pretty basic and then a few of the questions end up becoming a great deal more challenging. Figuring out coordinates is. And the unknown in the denominator, that's not an easy thing for a non-advanced student to accomplish, but there are a lot of questions that really basic students should be able to do."*

A sixth-grade mathematics teacher said that she preferred the MDTP to district-provided assessments.

> *"I like the questions that they ask. I think that there is a good amount of variety and rigor. With regard to the other assessments that we are given by the district to use, I prefer the MDTP [tests] over the benchmarks or end-of-course exams that are provided. It more reflects the type of question that I would expect a student who has mastered that content should know… for the next course. It does a very good job of asking those questions. The results of it I trust more than the tests from… the district."*

Thirteen teachers offered suggestions for improving the quality of MDTP testing. Many teachers explained their "less than perfect" ratings by commenting on the length of the tests, particularly the difficulty that students have in completing an MDTP test during one class period. A few of their comments follow:

> *"The one thing about the number of questions, which is why I didn't give it a 5, is that the students take a long time to finish the test. Some of them require more than a 50-minute block. I know it says to give it within a certain time period, but the students get frustrated when they don't finish, and they are used to the CSTs not being timed. I see the reason for it being timed. I mean, if you can't do it in a 45-minute setting, maybe it's too hard for you. Or you are guessing. But a lot of the students lately have been taking a lot of time with testing."*

> *"It's a very long test and it's one of the first tests they take at the beginning of the year – and it's kind of daunting for them. I think it's set up so that the beginning questions are easier and then it gets harder and more complicated and more into the… math skills that I'm assuming that they haven't been exposed to yet. So, I don't know, it just feels like it is really, really long and there are lots of questions and when the kids see how many questions, their faces go like [makes 'yikes' face]."*

> *"I will say that it says that it is a 45-minute timed test, and maybe this is our problem, but we are not just doing it in 45 minutes. We're giving them at least an hour, an hour*

and 15 minutes. Our students – even our advanced students – are taking more than an hour, a lot of them, and we're thinking 'gosh maybe kids their brains are just moving slower than they were 5 years ago or something.'"

All of the teachers interviewed mentioned that they thought the MDTP tests were "ready for an update" – and many teachers mentioned the phase-in of the Common Core Standards as the primary motivator for change.

"The new Common Core Standards are kind of shaking a lot of things up. I don't know how in the world they [MDTP] plan on scoring [open-ended questions], but they are going to have to address performance standards on this test."

The inclusion of open-ended questions, more complex problems, "ramping up" the difficulty level across tests, and increasing the range of difficulty on a given test (to include both easier and harder questions) were also mentioned as possible considerations when updating the MDTP tests. For example,

"Placement of the questions. I would have put them in a different order. The spiraling option. Not so many straightforward questions. Not just get the answer and plug it in. Rather, the spiraling method would tell us if they really understood the question and the content, not just if they can do the math."

"I wish that [the questions were] more open ended as opposed to being multiple choice. However, I don't know how it would quite… how it would look… perhaps the online assessment would do that."

"We noticed last year that it seems that the Algebra test might be a little easier than the Pre-Algebra. Some of the [same] kids scored higher on the algebra than they did on the Pre-Algebra."

"That would be the only thing. Make the Algebra a tiny but more difficult. Or, if the Pre-Algebra was a little bit easier. Level them out a little bit."

Usefulness

The mean usefulness rating for MDTP tests was 4.4 out of 5. Teachers whose MDTP use was above the median rated the usefulness of MDTP tests slightly higher than teachers whose MDTP test use was below the median (4.4 v. 4.3). On the other hand, teachers whose students' mathematics gains were above the median rated the usefulness of MDTP tests slightly lower than teachers whose students' gains were below the median (4.3 v. 4.4).

When asked to explain their ratings, five teachers remarked that MDTP results helped them shape or focus their teaching,

"I do use [the MDTP] to guide my instruction. I think that some teachers might not use it that way, but after the initial results, [I] always go back and look to see – throughout

> *the year as [I] approach new content – 'Where were my students on this [topic]? Why is this student having so much difficulty?'"*

> *"We had a temporary vice principal three years ago and that's when we decided to use the MDTP. She told us all the things you can do with the MDTP – because we gave it at the end of the year and also the beginning of the year. She said that we could use a lot of those types of questions to guide our instruction each day and to guide our lesson planning. Like, if I am teaching Pre-Algebra, [what's on the MDTP test] is what my kids should be able to do at the end of the year."*

Four teachers mentioned the usefulness of the MDTP in making mathematics course placement decisions – but cautioned against using any one assessment for high stakes decisions,

> *"I have found that if the kids do well on those tests – or relatively well – then they tend to do well in the Algebra class. We look at that data before we say yes they can go [into Algebra] or no. And then the teacher [who] gets them next, she tells us how they are doing."*

> *"Because to me any kind of test is subjective. I appreciate the information that I get [from the MDTP], but I always tell my students, 'It's not the only thing.' It's just one test in the spectrum of all kinds of assessments to [help me] know that student. I mean, you don't want to say 'this person got this score so they must really understand this,' but you have to assess them in other ways. If you ask them the question in a little different way they might not conceptually understand. They [might be] good at back-ending the multiple-choice answers and figuring it out that way."*

Four additional teachers said that the MDTP was a useful diagnostic tool – though several teachers voiced their frustration about their inability to provide targeted support for students, given time constraints and scheduling challenges.

> *"I can literally go back and find quickly just from this exam where my kids are struggling. Without having to compile something from DataDirector, I can look at the graphs for each question that they didn't get. And then [I can] go back to that question to see what the problem is – and I know that I can cover that question."*

Other positive characteristics of the MDTP mentioned by teachers included that it provided a baseline or "snapshot" of students' strengths and weaknesses – especially at the beginning of the year,

> *"It gives us a good snapshot of where the kids are at. If you had more time to analyze the data that would be useful, but with a gazillion kids and changing classes the time to use it is not there. Usefulness is there."*

Another teacher praised the ability to use MDTP tests as pre-post indicators of growth – for both teachers and students,

"I think it's also good for students. Usually what I do is that I administer the test [at the beginning of the year] and we'll go over it, but I keep the paper until the end. And just before we take the post-test, I'll give it [back] to them and we'll revisit it. And I'll go, 'OK so you did this the first time you took it, remember that? And you didn't know anything in the course then. But now, you've gone through this entire course so you should really be able to improve your score.' So that's sort of a motivator. Like 'Oh, my, gosh, I only got 10 right the first time. I can double that now.'"

Still another teacher spoke favorably about the relatively quick and easy access to results.

Eight teachers offered suggestions for improving the usefulness of MDTP testing. These teachers commented that they would like to have even speedier access to MDTP results.

"It takes some time. There is a time delay between getting the results back and being able to use the data. [Then it takes time] to look through the data. Quicker results with data already aggregated."

They also remarked that an online version of the MDTP would be helpful. [Ironically, these teachers were requesting something that is already available through Daskala.]

"Online would be a 5 [rating] because there is so much more information you can get. If I want to know how long they spent per question, I can see it. How long they spent on the entire test or on these [specific] questions. I can group the standards and see how long they spent on each standard. And it's faster."

"The online version would mean that we could get the results quickly and I could have them all in one spot instead of keeping all of that paper for years and years."

Teachers said that they would benefit from training focused on using test results to improve students' understanding of the mathematics topics covered on the test.

"The only thing I can think of is if they went a little bit farther and provided – when they say that students haven't met the expected standard of mastery for that section – what type of things they could do next. That might help teachers use the report a little bit better."

"I don't have very much training besides just administering the test. I'm not sure what to do after that besides grouping them based on what they need to improve on. It's pretty much user fault."

They felt that the test was too hard for their students.

"I have students who are proficient on the CST or maybe even advanced and I'm looking at their scores here and thinking, 'Wow, they didn't do very well on this test.' It's more challenging than I think it should be in some ways."

Finally, they remarked that they would like to have access to materials for parents and students that would help them both understand MDTP results and provide supplemental materials for students when test results were low in specific areas.

> *"Also, the parent letters should be more specific. Parents always want to know what to help kids with and there is not enough information in the letters to help them do that. They don't know what the letters mean."*

> *"I think if we could actually figure out a parent component. I don't know how we could do that. If we could do that electronically, or… This could be done on a site-by-site basis where we bring the parents in and say 'This is a test we gave your student and these are the skills this student needs to work on to be successful in the next course.' So, over the summer, [these support materials] can go home with them and they work on exponents or whatever skill it may be. Or, if you could come up with a website that the students could go to for free and log in with their little code or whatever and it customizes what they need to work on. That would be like a dream world."*

Impact

The mean impact rating for MDTP tests was 3.8 out of 5. Teachers whose MDTP use was above the median rated the impact of MDTP tests lower than teachers whose MDTP use was below the median (3.5 v. 4.3). Similarly, teachers whose students' gains in mathematics were above the median rated the impact of MDTP tests lower than teachers whose students' gains were below the median (3.5 v. 4.1).

When asked to explain their ratings, nine teachers remarked that MDTP results had a direct impact on their teaching, especially with respect to diagnosing students' areas of strength and weakness.

> *"It's certainly helped me shape my teaching style. Since I learned about it and started using it right from the get-go, it has been an important part of my teaching practice. I feel like it helps me know how I can help my kids. The diagnostic tool aspect is very important."*

> *"Going back to the detailed description of individual kids and what they need help on – [the MDTP] helps me kind of tailor my instruction. Where to start, what to work on first, what I need to focus on – not with individual kids – but as a whole. [The kids] kind of fall into a cluster. Lot of the kids, especially the Algebra Readiness kids (I'd say that about 70-75 percent of them) fall into the cluster of needing [help with] similar math concepts. It helps tailor my instruction and my lessons."*

Seven teachers said that the MDTP impacted student placement decisions at their school.

> *"I think it works really well. It does give us good indicators that we can use. I had one student who did not do well on [the MDTP test] and I did not suggest that she jump*

[ahead] to algebra. But they used the CST scores for her and put her in it anyway, even thought I had not recommended her. Within 6 weeks she was failing and the math teacher had to move her down to 7th grade. I have found that if we use the MDTP and the other [indicators] that we use it works well. But the CST is not as good of an indicator."

Other teachers' comments related to the impact of MDTP tests were related to challenges associated with using MDTP results effectively and cautions about using MDTP tests for placment and/or relying upon the MDTP too heavily. The following quotes illustrate.

"I'm taking off a point [from the rating]. As much as I would like to spend more time using more of the data that I get – and the graphs for each class you give us are just wonderful – when I'm dealing with four or five classes it's hard to put a composite picture together, and what to do with it. But it's still good. I think the information is well thought out, it's easy to see it, and I can look at the item analysis and see which [questions] the students have problems with. It's just that if three kids in period 1 and four kids in period 5 [have those problem areas], how do you address those skills across the board."

and cautions about using MDTP tests for placement and/or relying upon the MDTP too heavily.

"Because it's not the end all and the be all. It's just gives me an idea. Again, when you take a test one time, who knows what [students] are thinking. And who knows what they place on a test. I tell them right up front that this [test] could determine where you get placed when a certain topic comes up. 'Cause I tell kids exactly what I do with [test results]. If I decide to give you some kind of assessment before the next topic then you got a second chance, but if I don't decide to give it, then I'm going to go strictly off of what this test said. So you want to try to be as accurate as you can so that you don't end up in a group that you're not supposed to be in."

4.4 MDTP Materials and Supports

4.3.1 Voluntary Use of MDTP Materials and Supports

Next, teachers were asked whether they had ever used a range of additional MDTP materials and services, including written response materials, extension activities, regional conferences, MDTP-provided informational sessions at schools, the MDTP newsletter, and MDTP teacher leadership institutes. Only two teachers had ever used any of these MDTP materials and supports; 11 teachers (55 percent) remarked that they unaware that any of the supplemental MDTP materials or supports were available. One of the teachers who reported use of the other materials and services said that he had read the MDTP newsletter. The other teacher had attended a training session led by MDTP staff and remarked, "I know as far as [MDTP Staff Member] coming out. He's like a statistician, I believe. And he is very knowledgeable and more than willing to come out to your school. I know who he is and he's good."

4.3.2 Ratings of MDTP Materials and Supports

Although the interview protocol called for teachers to rate the quality, usefulness, and impact of the additional MDTP materials and services listed above, too few teachers had used these materials and services to include results in this report.

4.3.3 Relative Importance of MDTP Tests, Materials, and Supports

The "Spend-a-Dot" activity was used to determine the relative importance that teachers assigned to a range of MDTP tests, materials, and supports. Teachers were given a list of 11 MDTP offerings and 22 adhesive dots, and then asked to distribute or "spend" the dots based on the impact that each of the offerings *has had* on their mathematics program. Although most teachers were unaware of the full range of MDTP offerings, in almost every case they told the interviewer that they wished to spend their dots based on the impact that each offering *would have* on their mathematics program, whether they knew about – or had used – that offering or not. Therefore, rather than viewing these ratings as measures of impact, we should consider them indicators of the kinds of tests, materials, and supports desired by teachers.

A summary of teachers' ratings can be found in Table 4 (below). Overall, Hard Copy Diagnostic Results Reports for Teachers received the highest mean number of dots (3.4 dots), followed by Written Response Materials (2.8 dots), and Extension Activities (2.8 dots). Offerings receiving the lowest mean number of dots included Regional Conferences (.5 dots), the MDTP Newsletter (.8 dots), and the MDTP Leadership Institute (.9 dots).

Table 4
Mean Rating and Rank of MDTP Materials and Services, Overall and by Level of Use,
Student Mathematics Gain, and Group

MDTP Tests, Materials, Services		MDTP Use		Student Mathematics Gain		Group
	Overall n=20	Above Median n=13	Below Median n=7	Above Median n=12	Below Median n=8	Above Median Use/Gain n=7
	Mean/Rank	Mean/Rank	Mean/Rank	Mean/Rank	Mean/Rank	Mean/Rank
Hard Copy Diagnostic Results Reports for Teachers	3.4/(1)	3.4/(2)	3.2/(2)	3.6/(1)	3.0/(2)	4.3/(1)
Written Response Materials	2.8/(2)	3.5/(1)	1.6/(7)	2.0/(7)	4.0/(1)	2.3/(5)
Extension Activities	2.8/(2)	3.1/(3)	2.3/(5)	2.8/(3)	2.8/(3)	3.1/(2)
Online Diagnostic Results Reporting for Teachers (Daskala)	2.7/(4)	2.2/(4)	3.8/(1)	3.3/(2)	1.8/(6)	2.7/(3)
Hard Copy MDTP Tests	2.5/(5)	2.1/(6)	3.1/(3)	2.8/(3)	2.0/(5)	2.6/(4)
Individual Results Letters for Students and Parents	2.4/(6)	2.2/(4)	2.7/(4)	2.3/(6)	2.5/(4)	1.9/(7)
Online MDTP Testing	2.0/(7)	1.8/(7)	2.3/(5)	2.6/(5)	1.1/(9)	2.3/(5)
MDTP-Provided Meetings at Schools	1.3/(8)	1.2/(8)	1.6/(7)	1.2/(8)	1.5/(7)	1.4/(8)
MDTP Teacher Leadership Institute	.9/(9)	.9/(10)	.9/(9)	.8/(9)	1.1/(9)	.9/(9)
MDTP Newsletter	.8/(10)	1.1/(9)	.3/(11)	.3/(10)	1.5/(7)	.3/(10)
Regional Conferences	.5/(11)	.5/(11)	.4/(10)	.3/(10)	.8/(11)	.3/(10)

After teachers had completed the rating exercise, they were asked to explain their reasons for selecting their highest rated MDTP offerings. Examples of teachers' comments for most MDTP materials and services are provided below.

Hard Copy Diagnostic Results Reports for Teachers – Ranked #1, Overall (3.4 Dots)

Teachers indicated that hard-copy diagnostic reports had a notable impact on their mathematics programs. They remarked that results reports were used to determine students' strengths and weaknesses, both within and across classes, to inform schoolwide planning processes, and to adjust mathematics curriculum content or pacing – with the ultimate goal of improving student achievement. Hard Copy Diagnostic Results Reports for Teachers were ranked #1 or #2 by all "groups" of teachers – those whose use of MDTP testing was above/below the median, those whose students' gains in mathematics were above/below the median, and those who were in both the above the median use and

student gain categories. Two Group 1 teachers' remarks about hard-copy diagnostic reports are provided below.

> "The reports that come from [MDTP] – I always look at those. I look at the collated results by class, and then I compare the sections of my class. I see how different groups of kids test out. And we used the results for our WASC [Western Association of Schools and Colleges] plan to come up with a game plan for raising student achievement, by grade level. I always set aside a day – a Saturday – to come in and look at my test results so that I can figure out what's going on with my students. I can make decisions about changing my timeline or curriculum to make instruction better. To me the reports are very useful. It helps me do my job."

> "I really use the graphs and other information to drive my instruction. And using that information, I have been somewhat successful in moving my kids, which is always my goal."

Written Response Materials – Tied for #2, Overall (2.8 Dots)

Even though none of the interviewees had ever used MDTP's written response materials, teachers believed that they *would have* a strong impact on their mathematics programs, if they used them. Teachers remarked that they did not have sufficient time or expertise to craft their own written response items, that analyzing students' responses to written response items would give them insight into students' misunderstandings, and that written response materials will be extremely useful as the district moves toward implementing the Common Core. Interestingly, teachers whose MDTP use was above the median ranked written response materials much higher than teachers whose MDTP use was below the median (rank 1 v. 7). Conversely, teachers whose students' gains were above the median ranked written response materials much lower (rank 7) than teachers whose students' gains were below the median (rank 1). The following remarks about written response materials illustrate teachers' ratings.

> "I think that is one of the things that we don't have time to do anymore. What does a multiple-choice test tell you? You can't get what a student is thinking. Other than doing an interview, there is no way to find out what the student is thinking. Trying to calibrate a written response is too hard for teachers to take on. It's phenomenal work. I think that they have done a fantastic job."

> "I mostly give multiple choice tests simply because it's easier to grade, but the written response tasks allow [teachers] to see where students are making mistakes, what they're doing and I think that's important, as well. I don't think I spend enough time on that."

> "Are other math teachers aware of this stuff? As the school district is moving toward Common Core, are these about responding to math questions in writing, is that what this is? I would think that would become more valuable next year since we're moving toward Common Core."

Extension Activities – Tied for #2, Overall (2.8 Dots)

None of the teachers interviewed for the study had ever used MDTP's extension activities. However, they believed that the extension activities *would have* a strong impact on their mathematics programs, if they used them. Extension activities elicited more comments than any of the other MDTP materials and services listed in the Spend-a-Dot activity. Teachers remarked that – for the test to be useful to them – they should not have to "guess, 'Will this do it? Will that do it?'" when searching for extension activities that link directly to particular topics covered on MDTP tests. An Algebra teacher and a sixth-grade mathematics teacher explained, saying…

> *"Sometimes, as teachers, we are teaching our content and we have our bag of tricks, or whatever. And then, when you get [results from] a diagnostic assessment, sometimes it is hard to know where to go from there. Here I've got this data, this information – What am I going to do with it? It's nice to have a jumping block to start off from. I know what I've done before [to address student needs], but when it's from the people who make the diagnostic [test], my interpretation of what those results mean might be completely different than what the diagnostic assessment is really trying to get at. I think [extension activities] would be really powerful to help guide the teacher into using the MDTP in the most effective way."*

> *"I think that in order for an educator to get the full benefit from [the MDTP test] you have to be able to look at the questions and think of activities around those questions that are going to engage the students. We are trained to look at the test and analyze the data and see which problems they didn't understand or struggled with and which they got correct. In order to scaffold to the next level, I need bridge activities with problems [in areas where my students struggled] to help connect the dots. I think something like [extension activities] would really help."*

Another Algebra teacher remarked that MDTP tests need to evolve if they are to support the district's implementation of the Common Core – and that open-ended extension activities, which are in line with the intent of the Common Core, will be useful.

> *"As the MDTP is written right now it's going to be less and less useful to me, with us moving to the Common Core. What's going to be more useful is to give students open-ended questions and then figure out what kind of things they are missing from that."*

Online Diagnostic Results Reporting (Daskala) – Ranked #4, Overall (2.7 Dots)

Even though they had never used (or did not even know about) Daskala, teachers voiced a desire for online access to students' MDTP results. Of the three teachers who had administered the MDTP online, only one Pre-Algebra teacher reported using Daskala to access student results – and he was enthusiastic about its features and usefulness.

"There's so much information that you can get from it, and it's a lot easier for me to look at. If I want to see how my kids did on a topic – Boom! I get it just like that. When I have to do that with paper [MDTP results], I'm kind of fumbling through. I have 130 or 140 kids, so it takes awhile. But I don't worry about it online. I can call up the kids who got 80 percent or 60 percent or 40 percent on a topic. I would put a little bit more [dots] on the reporting than the test."

Hard Copy MDTP Tests – Ranked #5, Overall (2.5 Dots)

Although teachers ranked hard copy MDTP tests #5, overall, many commented that the tests are a necessary component of the system, but that the results are most useful. As one teacher remarked as he was allocating his dots, "You have to give a little bit of importance to the tests, but the most to the reports." Several teachers remarked that they preferred hard copy to online tests, mostly because of challenges associated with technology and timely access to results.

"Hard copy tests are better than online. You get the results faster with online, but the online tests freak kids out because they get their results too fast and it makes some of them cry. With the hard copy, you can sit down and look at the test with the kids."

"I don't have computers in my room right now, so I can't do the online version, but I would like to some day. I gave [hard copy tests] the highest marks because I'm comfortable with them and use them right now. The online I don't use right now."

Individual Results Letters for Students and Parents – Ranked #6, Overall (2.4 Dots)

Teachers reported using MDTP results letters to inform students and their parents (in a timely way) about students' strengths and weaknesses, and to motivate students by showing them the growth they had made from the beginning to the end of the school year. However, teachers voiced concern about their inability to help parents understand where their students were struggling in mathematics, and to help parents help their students at home – and they wished for more descriptive parent letters and/or materials that could be used for this purpose.

"[The results letters] are motivating for students. The reports have given them motivation to work hard. More than a few kids have taken that to heart and worked hard during the year because they know they are going to be tested at the end. They never see their end-of-course grades until the end of the year. They don't see their CST scores until the next year. But the MDTP is immediate. That is huge, I think."

"[I use the Results Letters] mostly as a talking point at the beginning of the year to show students what their strengths are and where we need to go. I'm a big advocate for student and parent communication. If we've got the data we need to share the data, we need to talk about the data, we need to understand the data so they need to get a copy of it."

"I always send the letters home followed up by an email from me, because I usually get a strong response from parents if the score is low. [The Results Letters] are really for students and parents to get feedback on where their understanding is when they come in [to a new school year]. It helps [students] set their [learning] goals, and I have [students] write them down in their math notebooks. And [the Results Letters help] parents know what [students] need to work on throughout the year [outside] the classroom."

"I make copies and send the [Results Letters] home to parents and they say 'huh?' I make copies for the kids and then at the end of the year, I give them a copy of their pre-test and their post-test. The reports for me and the students – I would give a 5. [The Results Letters] for the parents, not so much."

"For the parents, I think that the little blurb that they get doesn't help them understand what their kids need to know. A lot of my kids who need help in math, their parents need help, too."

Online MDTP Testing – Ranked #7, Overall (2.0 Dots)

Although many teachers indicated that they are in favor of online MDTP testing, only three teachers in the study had ever administered the MDTP online. As mentioned above, several teachers said that they would administer the hard-copy version of the test before having students enter their answers online. They also indicated that lack of adequate and reliable technology and sufficient class time would impact their ability to effectively participate in online testing. However, in spite of challenges teachers mentioned, there is widespread interest in online MDTP testing.

"I think anything online right now helps save paper – and the students like to use their laptops. I do enjoy the online exams, but I notice that there is a real strong pattern that students are not showing their work and not working their way through problems as methodically as I would like, but it is a trade-off."

"I would put a whole bunch [of dots] on the online. There are lots of reasons. All of the Common Core – when they test for Common Core – it's going to be on the computer. So I do all of my tests online because it gets the kids ready... so when they get to the Common Core they're not going to panic. It's going to be like 'Oh, yeah, that's normal for me.'"

"I like the idea of [online testing], and kids might [like it, too], but like I said, when the computers aren't working and or if your network is down or if [students] are extremely slow it might take 10 minutes to get started. If you only have a 50-55 minute period then all of that time... Also, you try to teach the kids test-taking skills like cancelling out, and process of elimination and good estimation, and working backwards – they can't do that necessarily [on an online test]."

MDTP-Provided Meetings at Schools – Ranked #8, Overall (1.3 Dots)

Most of the teachers interviewed for this study mentioned that their class sizes and work loads had increased significantly over the past few years, and that the next school year promised to be even more challenging. Even so, several teachers remarked that they would be willing to attend meetings related to MDTP – to learn how to interpret MDTP test results, provide support for students in particular areas of weakness, and access and use extension activities and written response materials. One teacher cautioned that any meetings should be carefully structured, because she is "… a little wary of the teachers' meetings. They are either focused on what you already know or what isn't going to help you."

MDTP Leadership Institute – Ranked #9, Overall (.9 Dots)

There were no comments specific to the MDTP Leadership Institute. However, one teacher did remark, as he was placing his dots on this element, "I think we need more leadership going on."

MDTP Newsletter – Ranked #10, Overall (.8 Dots)

Although they reported being very short on discretionary time, given their heavy workload, several teachers remarked that they try to stay informed on topics related to mathematics curriculum and teaching practice. And, a few teachers said that a newsletter would be helpful in giving them ideas to improve their instruction. Only one teacher commented about the MDTP Newsletter, saying, "The newsletter, I do read. It's important to stay up to date on what's coming out."

Regional Conferences – Ranked #11, Overall (.5 Dots)

Although none of the teachers interviewed had ever attended a regional conference, a sixth-grade mathematics teacher described her reasons for assigning dots to this element.

> *"I think it would be really good for teachers to meet and talk about MDTP. Even though every teacher's student population is different, it would help us re-tweak our teaching. If there were several problems on, like, order of operations, how can we work together to come up with different websites and different examples [to teach that concept]. Not 'You have this type of class and I have that type of class so I'm not going to worry about the results of the test because my kids will never do well.' It's 'Here's the assessment and here's what we're looking for in kids doing well in an Algebra class. Here's what I need to work on.'"*

As she neared the end of the "Spend-a-Dot" activity, an Algebra teacher expressed frustration about being unaware of the range of MDTP materials and services available to her and her colleagues.

I was introduced to [MDTP testing] at another school. It was just basically handed to me and [I was told] 'Just do it.' Now I'm the one who is ordering [MDTP tests] and I didn't even know that these other things were available.

5.0 SUMMARY OF FINDINGS

The primary goals of this study were to examine the ways that secondary mathematics teachers *voluntarily* use a range of MDTP tests, materials, and services, and to collect teachers' opinions about the quality, usefulness, and impact of those tests, materials, and services. *For this study, voluntary MDTP testing refers to testing initiated by an individual teacher or by a particular school's mathematics department, as opposed to district-mandated testing for all students in selected mathematics courses.* Teachers who participated in the study were characterized as "above or below the median" with respect to (1) the number of MDTP test that they administered during the 2010-11 academic year and (2) their students' mean gains in mathematics achievement. Interview data were then analyzed to determine overall trends, as well as trends by above/below median MDTP use and student gain.

5.1 Voluntary Use of Pre-Algebra Readiness and Algebra Readiness Tests

The majority of teachers interviewed (70 percent) indicated that the decision to administer MDTP tests was made by their schools' mathematics departments, and that the tests were administered to every student enrolled in selected mathematics courses. Teachers whose MDTP test use was above the median and teachers whose students' gains in mathematics in past years was above the median were more likely to indicate that MDTP tests were administered, schoolwide, as a result of a mathematics department decision.

MDTP test results were most often used to ensure that students were appropriately placed in mathematics coursework (35 percent of the time) and to obtain a "snapshot" or baseline of student strengths and weaknesses at the beginning of the school year (35 percent). MDTP test results were also used as pre-post measures of students' skills and knowledge, to guide instruction, and to diagnose individual student learning needs.

Thirty percent of teachers reported that they administered an MDTP test only at the beginning of the school year, 20 percent of teachers reported end-of-year administration only, and 50 percent reported that they administered an MDTP test at both the beginning and at the end of the school year. Teachers whose students' mathematics gains had been above the median in past years were more likely to have administered an MDTP test only at the beginning of the school year than teachers whose students' gains were below the median. Test results from beginning-of-the-year administration were used to establish a baseline of students' skills and knowledge, to identify individual students' strengths and weaknesses in order to provide targeted support, to confirm mathematics course placement, and to guide instruction.

All of the teachers who reported administering MDTP tests only at the end of the school year said that they used rest results to inform placement for the next school year. In some cases, end-of-year MDTP testing was conducted at the request of schools that would be receiving students the following year. Teachers who administered MDTP tests at both the beginning and the end of the school year used test results primarily for mathematics course placement and pre-post assessments of growth; secondary uses included establishing a baseline at the beginning of the school year, identifying individual students' strengths and weaknesses, and guiding instruction.

Daskala

Three teachers indicated that they had administered MDTP tests online; all three of these teachers were above the median for both MDTP test use and past student mathematics gains. Although they indicated considerable support for Daskala, users voiced a few concerns about online testing. First, they believed that students are much more likely to "guess" when taking a test online – and recommend that students complete a paper-and-pencil version of the test before entering their answers into the online test screen. Second, they maintained that there is not enough time in one class period to complete the MDTP test, given logistical and technological challenges. Only one teacher reported using Daskala's drill-down results reporting.

Teachers' Comments about Online Testing
Although only three teachers reported administering the MDTP online, many teachers offered comments and suggestions related to online testing, in general. To eliminate "guessing," most teachers reported administering a given test in paper-pencil format first, and then having students enter their answers into the computer. In addition to helping students "take their time" with the test, this practice allowed them to make use of the range of problem-solving strategies they had learned in their mathematics instruction. Teachers were also concerned about the amount of time needed to get class sets of computers set up for testing (and put away at the end of the period), saying that students could not complete an MDTP test in only one class period. Finally, teachers reported that various problems with technology (e.g., networks going down, batteries dying, too few working computers) impact online testing.

On average, teachers participating in the study had been voluntarily administering MDTP tests for nearly seven years. More than half of the teachers indicated that their were differences between their early use and current use – most often, teachers said that they "actually use" MDTP results now, but that they didn't when they first used the test.

5.2   Ratings of Test Quality, Usefulness, and Impact

5.2.1   Quality

The mean quality rating for MDTP tests was 4.3 on a scale of 1 to 5 with 5 being the highest rating. Teachers whose MDTP test use or students' gains were above the median rated the

quality of tests slightly lower than teachers whose test use or student gains were below the median. Teachers appreciated the fact that MDTP tests are aligned with state mathematics standards, that test results are useful in identifying students strengths and weaknesses, and the variety and rigor of test questions. A few teachers felt that MDTP tests were too long, were "ready for an update" to ensure alignment with the Common Core, would benefit from the inclusion of open-ended or more complex questions, and should be revised to expand the range of difficulty to include easier and harder questions.

5.2.2 Usefulness

The mean usefulness rating for MDTP tests was 4.4 on a scale of 1 to 5. Teachers whose MDTP test use was above the median rated the usefulness of tests slightly higher than teachers whose test use was below the median. Conversely, teachers whose students' mathematics gains were above the median rated the usefulness of the tests slightly lower than teachers whose students' gains were below the median. Several teachers remarked that MDTP results helped them shape or focus their teaching, were useful when making mathematics placement decisions for students, helped them diagnose individual students' learning needs, gave them a snapshot of each of their sections' strengths and weaknesses, and provided a measure of growth from the beginning to the end of the school year. Suggestions for improvement included access to an online version of MDTP, training focused on using test results to improve student learning, and materials to help parents understand their students' MDTP scores and how to help them improve.

5.2.3 Impact

The mean impact rating for MDTP tests was 3.8 on a scale of 1 to 5. Teachers whose MDTP test use or students' gains were above the median rated the impact of MDTP tests lower than teachers whose MDTP test use or students' gains were below the median. Teachers explained their ratings by saying that MDTP results had a direct impact on their teaching, especially with respect to diagnosing students' strengths and weaknesses, and on student placement decisions at their school. On the other hand, teachers noted challenges associated with using MDTP test results effectively, and cautioned against relying only on MDTP tests for student placement.

5.3 Voluntary Use of Supplemental MDTP Materials and Supports

Interestingly, only two of the teachers interviewed (10 percent) had ever used any of the supplemental materials and supports provided by MDTP. Indeed, 55 percent of the teachers remarked that they were unaware of their availability. Although the interview protocol called for teachers to rate the quality, usefulness, and impact of these materials and supports, too few teachers responded to questions to include results in this report.

5.4 Relative Importance of the Range of MDTP Tests, Materials, and Supports

The Spend-a-Dot activity was used to determine the relative importance that teachers assigned to the range of MDTP tests, materials, and supports. Teachers were given a list of

11 MDTP offerings and 22 adhesive dots, and then asked to distribute or "spend" the dots based on the impact that each of the offerings had on their mathematics program. Although most teachers were unaware of the full range of MDTP offerings, all teachers elected to spend their dots based on the impact that each offering would have on their program, whether they knew about – or had used – that offering or not.

Overall, hard copy diagnostic results reports for teachers received the highest mean number of dots (3.4 dots), followed by written response materials (2.8 dots) and extension activities (2.8 dots). Offerings receiving the lowest mean number of dots included regional conferences (.5 dots), the MDTP newsletter (.8 dots), and the MDTP leadership institute (.9 dots). Teachers whose MDTP test use and students' mathematics gains had in past years been above the median ranked hard copy diagnostic results reports for teachers as number one (with 4.3 dots), followed by extension activities (with 3.1 dots).

6.0   CONCLUSIONS

The conclusions and observations below are drawn from interviews with 20 randomly selected teachers who voluntarily administered a Pre-Algebra or Algebra Readiness Test during the 2010-11 academic year.

1. **A majority of teachers participating in the study – and *all* of the teachers whose MDTP test use and students' mathematics gains in past years were above the median – reported that the decision to voluntarily administer MDTP tests was made by their schools' mathematics departments.** Betts, Hahn, and Zau (2011) found that *mandatory* MDTP testing was associated with gains in mathematics achievement the following year and that, if a student was given an MDTP test two years in a row, those gains persisted and strengthened slightly. The *voluntary* use of MDTP tests, on the other hand, had no detectable relationship to student gains in mathematics. Findings from the current study suggest that the decision of a mathematics department to administer MDTP tests to all students in selected courses may be associated with student achievement gains because the ways in which the schools used the test appear similar to the mandated districtwide use practiced in earlier years. That is, voluntary schoolwide administration and district-mandated administration may have a similar impact on student mathematics achievement, although we did not directly test this hypothesis. These findings should be shared with district- and school-level mathematics leaders, in order to encourage more schools to take advantage of MDTP testing and reporting.

2. **A majority of teachers reported that their schools used MDTP test results to ensure that students were appropriately placed in mathematics coursework – either at the beginning of the school year to validate current placement or at the end of the school year to inform placement decisions for the following year.** Given that the Betts, Hahn, and Zau (2011) study found that appropriate class placement was linked to improved student learning, the use of MDTP results (at least in part) to inform student placement might be considered good practice.

3. **All but one of the teachers whose MDTP test use and students' mathematics gains in past years were above the median administered MDTP tests at the beginning of the school year. Teachers reported using beginning-of-the-year test results to confirm or modify course placement – but also to get a baseline of students' individual strengths and weaknesses and to guide instruction.** This finding suggests teachers and schools should not use MDTP results for the sole purpose of informing placement decisions. Rather, using results to identify struggling students and providing assistance early in the year may also lead to improved student outcomes.

4. **A majority of teachers expressed keen interest in online administration of MDTP tests and results reporting, but only three teachers reported knowing about Daskala, which features both.** Because many teachers have already administered district benchmarks and other assessments online – with demonstrated success – efforts to inform teachers about Daskala should be expanded. At the same time, the concerns voiced by teachers about the challenges associated with online testing (including students being more likely to guess when not doing the test on paper first, and the difficulty of setting up computers and completing the test within a single class period) should be considered as Daskala evolves.

5. **Although teachers gave MDTP tests high ratings for quality and usefulness, ratings for impact were noticeably lower.** Teachers' comments indicate that the impact of MDTP testing would be greater if they had access to advice or materials that would help them know "what to do next" after reviewing students' test results. Teachers also indicated that they would appreciate having resources to provide to parents so that parents could assist their children with mathematics at home. These types of materials and services might prove more useful to teachers than others already offered by MDTP, but perceived by most teachers as having less impact.

6. **More than half of the teachers interviewed indicated that they were unaware that MDTP provided online testing and results reporting, written response materials, extension activities, regional conferences, a newsletter, or on-site assistance – that is, any materials and services beyond testing and reporting – and only a few teachers had ever accessed any of these materials or services.** At the same time, when asked what materials or services would be helpful to them, teachers listed many of these as highly desirable. In fact, written response materials and extension activities tied for second place when teachers were asked what materials and services would have the most impact on their mathematics programs. Informing teachers and schools about the availability of MDTP materials – and providing them – is clearly the "low hanging fruit" recommendation from this study.

7. **Many teachers indicated that they thought that the MDTP tests were "ready for an update" – especially given the phase-in of the Common Core Standards.** While several teachers indicated that the tests should feature more open-ended, complex, and difficult questions, an equal number of teachers felt that the tests are too long and too hard for their students.

References

Bachofer, Karen Volz, Julian R. Betts, and Andrew C. Zau. 2012. "The Impact of the Use of the Mathematics Diagnostic Testing Project in San Diego Unified School District: Teacher Survey Component." Manuscript submitted to the California Academic Partnership Project.

Betts, Julian R, Youjin Hahn, and Andrew C. Zau. 2011. "Does Diagnostic Math Testing Improve Student Learning?" Public Policy Institute of California, San Francisco, CA. Available at http://www.ppic.org/main/publication.asp?i=953.

About the Authors

Karen Volz Bachofer is the Director of the San Diego Education Research Alliance (SanDERA) in the Department of Economics at the University of California, San Diego. Previously she was the Executive Director of the San Diego Unified School District's Research and Evaluation Division, where her responsibilities included oversight of national, state, and district assessment and accountability processes and reporting, including the CAHSEE; internal, external, and commissioned research and evaluation activities; and the development and roll-out of the district's data management tool. She served as a member of California's Academic Performance Index (API) Technical Design Group and the Advisory Committee for the national evaluation of Title I Accountability Systems and School Improvement Efforts (TASSIE). She holds a Ph.D. in Education from the Claremont Graduate School and San Diego State University.

Andrew C. Zau is a senior statistician for the San Diego Education Research Alliance in the Department of Economics at the University of California, San Diego. Previously, he was a research associate at PPIC. Before joining PPIC, he was a SAS programmer and research assistant at the Naval Health Research Center in San Diego, where he investigated the health consequences of military service in Operations Desert Shield and Desert Storm. He holds a B.S. in bioengineering from the University of California, San Diego, and an M.P.H. in epidemiology from San Diego State University.

Julian R. Betts is professor and former chair of economics at the University of California, San Diego, where he is Executive Director of the San Diego Education Research Alliance (SanDERA). He is an adjunct policy fellow and a Bren fellow at the Public Policy Institute of California. He is also a research associate at the National Bureau of Economic Research and UC San Diego Campus Director of the University of California Educational Evaluation Center. He has written extensively on the link between student outcomes and measures of school spending, and he has studied the role that educational standards, accountability, teacher qualifications, and school choice play in student achievement. He has served on three National Academy of Sciences panels, the Consensus Panel of the National Charter School Research Project, and various advisory groups for the U.S. Department of Education. He is also principal investigator for the federally mandated Evaluation of Conversion Magnet Schools and Co-Principal Investigator of the Evaluation of the DC Choice Program. He holds a Ph.D. in economics from Queen's University, Kingston, Ontario, Canada.

Acknowledgements

APPENDIX

An Evaluation of the Mathematics Diagnostic Testing Project (MDTP)
Using Evidence From San Diego: Teacher Interview Component

TEACHER INTERVIEW PROTOCOL

Thank you for agreeing to participate in this interview today. My name is Karen Bachofer and I'm happy to meet you. As you may know, San Diego Unified School District (SDUSD) is working with the Department of Economics at UCSD on a research project to study the Mathematics Diagnostic Testing Project (MDTP), which provides teachers across California with free diagnostic testing of their students' mathematics preparation. Specifically, the research is studying the ways SDUSD teachers have used MDTP tests, gathering descriptions of instructional practice in mathematics, collecting feedback from teachers about MDTP tests, materials, and services, and determining whether the use of the MDTP tests has impacted student achievement in mathematics.

One component of the research project is a teacher survey directed to all secondary mathematics teachers in SDUSD – and I hope you've already had a chance to complete the survey. Another component of the project includes interviews with a random sample of 20 mathematics teachers who administered MDTP tests to their students during the last school year. You have been randomly selected to participate in the interview component of the study, which should take about 30 minutes. During the interview, we'll talk about the ways that you have used MDTP tests, and your opinions about the quality, usefulness, and impact of MDTP tests, materials, and services. You will receive a $25 gift card to thank you for your participation.

Before we begin, may I ask that you sign and date this "Teacher Consent to Participate in a Research Study?"

As a reminder, please know that your responses to interview questions are confidential, and any reports or presentations about the study will not include the name(s) of any teachers or school sites. You may feel free to skip any questions that you don't wish to answer and you may end this interview at any time – asking that the audiotape be erased, if you wish. May I have your permission to audiotape this interview so that important information is not lost?

Teacher Use of MDTP Tests
Let's start by getting some information about the courses you taught and the MDTP tests that you voluntarily administered during the 2010-11 school year.

1. Which mathematics courses did you teach during the 2010-11 school year? Which MDTP tests did you administer last year?	
Course	MDTP Test
1.a.	1.b.
1.c.	1.d.

2. Did you use MDTP tests in all of your courses?	Y / N
2.a. Why or why not?	

3.	Did you use MDTP tests in all sections of your courses?	Y / N

3.a.	Why or why not?

4.	When during the school year did you administer the MDTP tests (e.g., beginning of the school year)?

4.a.	Why did you decide on that timeframe?

5.	How have you used the results of the MDTP tests?

6.	Have you ever administered MDTP tests as part of the district's mandatory administration?	Y / N

6.a.	Are there differences between the mandatory administration and your voluntary administration?

7.	Have you ever administered the online (Daskala) version of an MDTP test?	Y / N
7.a.	Were there any challenges associated with using the online version (computer access)?	Y / N

7.b.	Did you use the drill-down capabilities of Daskala?	Y / N
7.c.	What is your opinion of the online version of MDTP? Of the drill-down capabilities?	

8.	How many years have you been voluntarily administering MDTP tests to your students?	
8.a.	I'd like you to think about the first time you voluntarily used MDTP tests with your students and compare it with your most recent voluntary use of MDTP tests. Has your MDTP use changed over time?	Y / N
8.b	Please describe the differences in your voluntary MDTP use (e.g., selection of classes/students, review/use of results, collaboration with other teachers, modification of practice, use of MDTP materials and services).	

Next, let's talk about the quality, usefulness, and impact of MDTP tests.

	Rating
9. On a scale of 1-5, with 5 being high, how would you rate the *quality* of MDTP tests?	

9.a. Can you please explain your rating?

_____

_____

9.b. Do you have any suggestions for improving the *quality* of the MDTP tests?

_____

10. On a scale of 1-5, with 5 being high, how would you rate the *usefulness* of MDTP tests?	

10.a. Can you please explain your rating?

_____

_____

10.b. Do you have any suggestions for improving the *usefulness* of the MDTP tests?

_____

11. On a scale of 1-5, with 5 being high, how would you rate the *impact* of MDTP testing on the goal of teaching mathematics to your students?	

11.a. Can you please explain your rating?

_____

_____

11.b. Do you have any suggestions for improving the *impact* of MDTP testing on the goal of teaching mathematics to your students?

_____

_____

Finally, let's talk about the quality, usefulness, and impact of MDTP materials and services.

	Y / N
12. Have you ever used any of the other MDTP materials and services, including diagnostic reports (i.e., teacher reports, reports for parents), written response materials (i.e., general scoring rubrics, additional test items, essence statements for each item, specific scoring rubric for each item), regional conferences, meetings at schools to help teachers interpret results, test materials (i.e., class sets of student answer sheets)?	

	Rating
13. On a scale of 1-5, with 5 being high, how would you rate the *quality* of the other MDTP materials and services?	

13.a. Can you please explain your rating?

13.b. Do you have any suggestions for improving the *quality* of the other MDTP materials and services?

14. On a scale of 1-5, with 5 being high, how would you rate the *usefulness* of the other MDTP materials and services?	

14.a. Can you please explain your rating?

14.b. Do you have any suggestions for improving the *usefulness* of the other MDTP materials and services?

15. On a scale of 1-5, with 5 being high, how would you rate the *impact* of the other MDTP materials and services on the goal of teaching mathematics to your students?	

15.a. Can you please explain your rating?

15.b. Do you have any suggestions for improving the *impact* of the other MDTP materials and services on the goal of teaching mathematics to your students?

16. Here is a list of the materials and services provided by MDTP and a set of 22 colored dots. I'd like to ask you to distribute ("spend") your dots based upon the impact you think that element has had on the success of your mathematics program. You can spend all of your dots on any one material or service, and it's OK if some receive no dots at all.

16.a. I notice that you gave the highest number of dots to_____. Can you please explain your rating?

16.b. I notice that you gave the second highest number of dots to_____. Can you please explain your rating?

16.c. I notice that you gave the lowest number of dots to _____. Can you please explain your rating?

I have no more questions for you, other than to ask you a bit about your teaching career and how long you've worked at this school/in the district.

Interviewee's Name	Contact Information

How long have you been teaching mathematics? _____
How long have you been assigned to this school? _____
How long have you worked in San Diego Unified School District? _____

Finally, I'd like you to select the $25 gift card you'd like me to send you. Would you prefer a gift card from Starbucks, Target, or Amazon.com?

☐ Starbucks   ☐ Target   ☐ Amazon.com

Do you have any questions for me before we wrap up our time together? Here is my card in case you'd like to contact me for any reason. Again, I thank you so much for taking time to talk with me today.