



## TELL MASS Student Achievement and Teacher Retention Analyses

### Introduction

In spring 2014, the Massachusetts Department of Elementary and Secondary Education (DESE) sponsored the second administration of the Teaching, Empowering, Leading, and Learning Survey (TELL Massachusetts) in collaboration with the New Teacher Center (NTC). More than 38,000 school-based, licensed educators (48 percent of all licensed educators in the state) shared their perceptions of the teaching and learning conditions in their schools that contribute to teacher effectiveness and student success. This

survey was initiated to examine whether supportive school environments are in place across the Commonwealth.

TELL Massachusetts is an anonymous survey designed to report educators' perceptions about the presence of teaching and learning conditions in the following constructs: Time, Facilities and Resources, Professional Development, School Leadership, Teacher Leadership, Instructional Practices and Support, Managing Student Conduct, and Community Support and Involvement. See Table 1 for descriptions of each construct.

TABLE 1. 2014 TELL MASSACHUSETTS SURVEY CONSTRUCTS

<b>Time</b> —Available time to plan, collaborate, provide instruction, and eliminate barriers to maximize instructional time during the school day
<b>Facilities and Resources</b> —Availability of instructional, technology, office, communication, and school resources to teachers
<b>Community Support and Involvement</b> —Community and parent/guardian communication and influence in the school
<b>Managing Student Conduct</b> —Policies and practices to address student conduct issues and ensure a safe school environment
<b>Teacher Leadership</b> —Teacher involvement in decisions that impact classroom and school practices
<b>School Leadership</b> —The ability of school leadership to create trusting, supportive environments and address teacher concerns
<b>Professional Development</b> —Availability and quality of learning opportunities for educators to enhance their teaching
<b>Instructional Practices and Support</b> —Data and support available to teachers to improve instruction and student learning

This brief consists of two parts. The first half of the brief outlines the research foundation specifically linking teaching conditions, as measured by the NTC Survey, to student achievement and teacher retention outcomes and summarizes the findings on the results of the 2014 TELL Massachusetts Survey. The second half of the brief, Appendices A-C provides the methods utilized in the analysis including the models used to test the associations between 2014 survey data and various student and teacher outcomes. The purpose of this report is to help stakeholders better understand the relationship between teaching conditions and outcomes of interest in Massachusetts. Results should be interpreted with caution given the overall response rate and aggregation of responses.

## **Providing Teachers with the Best Opportunity to Be Effective**

### *Connections Between Teaching Conditions and Student Learning*

Teachers' success is facilitated by a positive school context, which is characterized by the existence of support from leadership and a collaborative working environment (Johnson, 2006). In particular, research shows that strong, trusting relationships and supportive school leadership are linked to improved student achievement (Bryk & Schneider, 2002). Other research demonstrates the importance of communication and collaboration for improving student achievement. For example, in schools where teachers talked to each other about their work, and principals communicated with the community, students had higher reading and mathematics test scores than in schools where these conditions were not as strong. Additionally, these conditions had a greater impact on test scores than the experience or credentials of the staff (Leana & Pil, 2006).

Additional recent work by Kraft and Papay (2014) uses student-teacher linked data and school-level teaching conditions as measured by the NTC survey. The researchers find that teachers who work in more supportive environments become more effective at raising student achievement on standardized tests over time than do teachers who work in

less supportive environments, after controlling for student characteristics, prior test scores, and teacher and school characteristics. Teachers in schools that had the most positive teaching conditions (in the 75th percentile as measured by a composite indicator created from 24 questions in NTC's TELL Survey) were 38 percent more effective after a decade than teachers in schools in the 25th percentile. Over two years, teachers were 11 percent more effective if they worked in schools with positive teaching conditions. Research specifically utilizing TELL Massachusetts Survey data also supports these connections between school supports and teacher effectiveness and student learning. Analyses of the 2012 TELL Massachusetts data, for example, demonstrates that particular teaching conditions—those related to effectively managing student behavior, support high quality instructional practices and communicate effectively with parents and the community—were significantly associated with student performance on Massachusetts state assessments after controlling for school, teacher, and student characteristics across different grade levels (New Teacher Center, 2013).

### *Connections Between Teaching Conditions and Teacher Retention*

A host of large-scale empirical studies provide evidence that teaching conditions matter in teachers' decisions about staying or leaving schools. In a meta-analysis of 34 studies, researchers suggest that teaching conditions influence teachers' career paths more than previously documented (Borman & Dowling, 2008). Boyd et al. (2011) demonstrate that teachers' perceptions of school administration support have the greatest influence on teacher retention decisions.

External researchers using NTC survey data from an instrument similar to the TELL Massachusetts Survey, also demonstrate associations between teaching conditions and teacher retention. Johnson, Kraft, and Papay (2011) find that teachers are more satisfied and plan to stay longer in schools with positive teaching conditions. Their work suggests that conditions such as a trusting atmosphere, a supportive and effective principal leadership, and collaborative colleagues are as important or more important than traditional conditions

such as facilities and resources in influencing teachers' decisions to stay in schools. This finding holds true after controlling for student and school characteristics such as the percentage of students categorized as low-income. Ladd (2009), also using TELL data, documents that teaching and learning conditions predict teacher plans to leave a school, independent of school demographics.

Analyses by NTC using the 2012 TELL Massachusetts Survey data indicate an association between teaching conditions and teachers selecting to stay in their current schools. Specifically, teachers who report wanting to remain working in their schools are far more positive about aspects of their inclusion in decision making at the school than those who indicate that they would move to another school or leave teaching altogether. Clear communication with parents and the community and school administrations' support of teachers' efforts to maintain discipline in their classrooms were also important influences on teachers' future employment plans, though not across all school levels. (To review these analyses, see the TELL Massachusetts website under the "Historical" tab <http://www.tellmass.org/historical>.)

This robust research foundation demonstrates a consistent link between teaching conditions and both student achievement and teacher retention outcomes. This brief adds to this work by analyzing 2014 TELL Massachusetts Survey data. The brief provides a summary of survey results and analyses at the state level overall as well as by school level, e.g., elementary, middle, and high school.

## TELL Participants

NTC administered the TELL Massachusetts Survey to all school-based, licensed educators in early 2014. In total, 38,217 educators in Massachusetts participated, yielding a response rate of 48 percent. This is a four-percentage-point decline from the 52 percent response rate in the 2012 administration of the survey. Respondents in 2014 include several categories of educators: 89 percent are teachers, approximately one percent are principals, one percent are assistant principals, and nine percent are other education professionals such as librarians and school psychologists. This distribution is similar to the data collected two years ago in 2012 (Table 2).

Respondents*	2014 Response Rate (N)
Teachers	88.6 (33,854)
Principals	1.2 (471)
Assistant Principals	1.2 (451)
Other Education Professionals	9.0 (3,441)
Total	38,217

**\*Note.** The respondent category "teachers" includes instructional coaches, department heads, literacy specialists, etc. The respondent category "Other Education Professionals" includes school counselors, school psychologists, social workers, etc.

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**TEACHERS WHO REPORT** *wanting to remain working in their schools are far more positive about aspects of their inclusion in decision making at the school than those who indicate that they would move to another school or leave teaching altogether.*

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Response rates also vary by school level. As Table 3 demonstrates, the 2014 sample participating in the survey includes 49 percent of elementary school educators, compared to 55 percent in 2012; 49 percent of middle school educators, compared to 53 percent in 2012; and 43 percent of high school educators, compared to 49 percent in 2012. In 2014, a very small group of educators were identified

as working in special or unidentified schools that were not present in the previous administration.

Of the 1,790 schools across the state of Massachusetts, 971 met or exceeded the 50 percent minimum response rate threshold of 50 percent to have access to individual school-level reports on their survey results. Those results can be accessed at [www.tellmass.org](http://www.tellmass.org).

TABLE 3. 2014 SURVEY RESPONSE RATE BY SCHOOL TYPE

School Level	2014			2012		
	Number of Respondents	Total School-Based Licensed Educators Surveyed	Percent Responded	Number of Respondents	Total School-Based Licensed Educators Surveyed	Percent Responded
Elementary	18,002	36,126	49.8	20,349	37,363	54.5
Middle	8,114	16,438	49.4	8,648	16,359	52.9
High	11,913	27,429	43.4	13,394	27,164	49.3
Special Schools	40	55	72.7			
Undefined Schools	148	152	97.4			
Total	38,217	80,200	47.7	42,404	80,906	52.4

**RESPONSE RATES VARY BY SCHOOL LEVEL.** *The 2014 sample participating in the survey includes 49 percent of elementary school educators, compared to 55 percent in 2012; 49 percent of middle school educators, compared to 53 percent in 2012; and 43 percent of high school educators, compared to 49 percent in 2012.*

## How Massachusetts Teaching Conditions Impact Student Learning

The goal of the analyses summarized in this report is to better understand how teaching conditions and student performance and teacher retention outcomes intersect in Massachusetts schools—do schools with more positive teaching conditions have better student performance, greater growth in terms of student achievement gains, or higher teacher retention?

A brief summary of outcomes and approaches is provided here, with a detailed methodology included in Appendix A. The Composite Performance Index (CPI Math) is used here to measure student performance in terms of absolute achievement. A second student performance measure is a growth indicator that assesses academic progress using the Student Growth Percentile in Mathematics (SGP Math).<sup>1</sup> The estimated teacher retention variable is calculated from the survey question, “Which of the following best describes your immediate professional plans?,” which represents the rate at which teachers leave the classroom, or, teacher attrition. The teaching conditions measures include both an overall indicator that combines all eight constructs as well as individual indicators by construct (See Table 1). All measures are reported at the school level.

Using statistical approaches appropriate for school-level data, these analyses isolate the effect of teaching conditions from other factors research suggests are related to student academic performance, such as teacher and student background characteristics. The analyses combine school-level data across elementary, middle, and high schools for state-level findings and present results by school level. See Appendix A for a full discussion of statistical modeling and variables.

1. In 2012, analyses were conducted using both Math and ELA performance scores and the results were similar. NTC chose to report on Math as it is the subject most likely to be influenced by in-school factors and instruction. See [http://www.tellmass.org/uploads/File/MA12\\_brief\\_ach\\_ret.pdf](http://www.tellmass.org/uploads/File/MA12_brief_ach_ret.pdf) for the 2012 report.

## Teaching Conditions and Student Performance Analyses

**Student Performance**—*In schools where educators report more positive teaching conditions, higher percentages of students achieve better results on the Composite Performance Index. Specifically, two conditions consistently predict student achievement. Schools with strong student management systems and strong community support have more students performing at a higher level as measured by the CPI.*

These results are important because they show the impact of teaching conditions while controlling for factors such as student poverty, school size, and teacher experience at the overall state level (Table B-1). Notably, the contribution of teaching conditions to student achievement is stronger than the contribution of teacher assignment, percent student attrition and student-teacher ratios.

Analyses for each school level, testing the association between the percentage of students’ performance on the CPI and overall teaching conditions, suggest that elementary and middle schools (Table B-1 and B-2, respectively) are more likely to have more students rated as performing better on the CPI if they have better teaching conditions. The analyses found that the contribution of teaching conditions to student learning is greater than the contribution of percentage of the population participating in special education (both levels), and student-teacher ratios (middle school level). See Appendix B: Tables B-2 through B-4 for model results displaying significant coefficients at each school level.

At the elementary and middle school levels, Community Support and Involvement and Managing Student Conduct have significant and positive associations with student learning after controlling for other student, teacher, and school factors (Tables B-5 and B-6). For complete models, see Appendix B: Tables B-5 through B-7.

**Student Academic Growth**—*In schools where educators perceive more positive teaching conditions, students show greater academic growth than students in similar schools with*

*less positive teaching conditions, and the impact of teaching conditions in these schools is stronger than the impact of other teacher and student factors. Additionally, schools where respondents have more positive perceptions of the student behavior systems in place demonstrate greater academic growth than similar schools where perceptions of student behavior systems are less positive.*

Again, our analyses control for other factors, and isolates the relationship between student academic growth and teaching conditions. At the state composite level, the data failed to demonstrate significance (Tables C-1-C-4).

Individual analyses for each school level testing the relationship between student academic growth and overall perceived teaching conditions show that the composite teaching conditions measure is not significant at any of the school levels. Given this, we continued the analyses at the individual factor level across school levels. See Appendix C: Tables C-5-C-7 for models at each school level.

When testing the association between each teaching condition construct and student growth at each school level, analyses indicate that Managing Student Conduct and School Leadership impacts student academic growth, at the elementary level. Higher perceptions of student behavior management and effective school leadership were associated with higher academic growth while lower perceptions of the same were associated with lower growth (see Table C-5). At the middle school level, we found that the Time Construct impacts student academic growth (Table C-6). At the high school level, Time, Instructional Practices and Support and Professional Development positively impact student academic growth (Table C-7). See Appendix C: Tables C-5-C-7 for school-level models showing significant teaching constructs.

## **Teaching Conditions and Teacher Retention Analyses**

***Teacher Retention—Consistent with student performance indicators, overall, perceptions of more positive teaching conditions are related to higher teacher retention, with fewer***

***teachers leaving their schools. Additionally, when considering individual teaching constructs, schools with positive teacher leadership and/or school leadership retain more teachers compared to schools whose educators had less positive perceptions about leadership.***

Even after including the contributions of other factors such as student and teacher background characteristics, data suggest that in schools where teachers report more positive teaching conditions, fewer teachers choose to move to other schools, leave the classroom, or leave education entirely. Additionally, at the overall state level, teaching conditions are the strongest predictor of teacher retention, nearly twice as strong as the percentage of students classified as low-income and 10 times more influential than the student teacher ratio. See Appendix D: Table D-1 for the full model.

When testing the association between the mean composite teaching conditions measure and teacher attrition at the different school levels (Tables D-2-D-4), results indicate a consistent relationship at all levels. Teacher retention is higher in schools where teachers perceive there are better teaching conditions compared to similar schools where teachers perceive there are less positive teaching conditions. Also, the influence of teaching conditions is consistently the strongest contributing factor to teacher retention across school levels. Appendix D: Tables D-2-D-4 presents tables associated with these findings.

Models that examine individual teaching condition constructs at each school level show that while different conditions matter at different school levels, teaching conditions do matter at all levels. In elementary schools, teachers are more likely to stay in those schools where they perceive strong teacher and school leadership, and the influence of these teaching conditions on decisions to stay is stronger than the impact of percent of teachers assigned to a classroom within their content area (Table D-5). At the middle school level, teacher leadership contributes to teacher decisions to remain in a school (Table D-6), and at the high school level, school leadership is associated with teacher decisions to stay or leave (Table D-7). See Appendix D: Tables D-5-D-7 for full models.

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## Summary

In summary, these analyses show that across important outcomes, such as student performance, student academic growth, and teacher retention, better teaching conditions are consistently associated with better outcomes, especially at the elementary and middle school levels. Across school levels, schools with more positive teaching conditions are associated with better overall student achievement, greater academic growth, and higher teacher retention compared to similar schools with lower perceived teaching conditions.

Together, these analyses demonstrate that many factors that are within the control of stakeholders and policy makers

contribute to creating environments where strong teaching and learning can occur. These findings suggest that student behavior management systems, community involvement, and teacher and school leadership play a key role in the outcomes of student learning, student academic gains, and teacher retention across school levels. Stakeholders may consider additional analyses to better understand the intersection between these conditions and outcomes of interest, especially at the high school level where positive perceptions of student management systems and strong community involvement are less typical than in elementary and middle schools. This evidence suggests that, overall, teaching conditions are consistently related to improved learning and teacher retention.

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## Appendix A. Model Specification and Variables

### Model Specifications

Statistical models appropriate for school-level data test the relationship between teaching conditions and student achievement using Ordinary Least Squares (OLS) regression. The OLS equation assumes there is a linear association between the outcome variable and the independent variable. For example, OLS assumes changes in teaching conditions are associated with changes in student achievement, and better teacher conditions are associated with better student achievement. An advantage of OLS is that it allows the relationship between teaching conditions and outcome variables to be isolated by controlling for other factors, such as teacher and student background characteristics. The following equation (1) specifies the regression model using percent proficient on the CPI as the outcome variable:

$$(1) Y_i = \beta_0 + \beta_1(\text{Student}) + \beta_2(\text{School}) + \beta_3(\text{Teacher}) + \beta_4(\text{Teaching Conditions}) + \beta_i$$

All variables are at the school level. The outcome variable  $Y_i$  in model (1) is the percent of students scoring proficient or above on the MCAS. The  $\beta_0$  represents the value of the outcome variable when all the independent variables are at zero. The independent variables are represented by  $\beta_1$ -4 and include blocks of characteristics about students, schools, teachers, and teaching conditions. Variables included in each block follow, and full descriptions are provided below.

- Student-level predictors—percent of minority students in the school, percent of students with free/reduced-price lunch, academic performance, etc.
- Teacher-level predictors—gender, years of experience, percent with an advanced degree, etc.
- School-level predictors—student-teacher ratio, enrollment, etc.

The teaching conditions measure consists of the average of the eight construct means for each school. The  $\beta$ , or betas, are values, one for each explanatory variable, that represent the strength and type of relationship the independent variable has to the dependent variable. If the  $\beta$  is positive, then as the independent variable increases, the outcome variable increases. If the  $\beta$  is negative, then as the independent variable increases, the outcome variable decreases. The  $\beta_i$  is the error term or the difference between the expected value generated by the regression equation and the observed value in the data for each school in this case.

The same model (2) is then calculated with the student growth indicator (median student growth percentile) as the outcome or  $Y_i$ .

$$(2) Y_i = \beta_0 + \beta_1(\text{Student}) + \beta_2(\text{School}) + \beta_3(\text{Teacher}) + \beta_4(\text{Teaching Conditions}) + \beta_i$$

The teacher retention regression model (3) follows a similar equation as presented for the student outcome models. The rate of teachers leaving classrooms is the outcome variable  $Y_i$ .

$$(3) Y_i = \beta_0 + \beta_1(\text{Student}) + \beta_2(\text{School}) + \beta_3(\text{Teacher}) + \beta_4(\text{Teaching Conditions}) + \beta_i$$

### Outcome Variables

#### Student Performance (CPI Math)

The Composite Performance Index (CPI) is a 100-point index that assigns 100, 75, 50, 25, or 0 points to each student participating in MCAS and MCAS-Alternate (MCAS-Alt) Assessments based on their performance. The total points assigned to each student are added together, and the sum is divided by the total number of students assessed. The result is a number between 0 and 100, which constitutes a district, school, or group's CPI for that subject and student group. The CPI is a measure of the extent to which students are progressing toward proficiency (a CPI of 100) in ELA and mathematics. A CPI is calculated separately for ELA and mathematics, and at all levels: state, district, school, and student group. A school or district's CPI is calculated by



combining points generated by students who take the standard MCAS tests with points generated by students who take the MCAS-Alt.

### Academic Growth (SGP Math)

Each student who participated in the MCAS ELA or mathematics tests in grades 4–8 or 10 and who also took the last MCAS test in that subject receives a Student Growth Percentile (SGP) score. The SGP compares a student's MCAS score with the scores of all students in the state at that grade level who received similar MCAS scores in prior years. SGPs range from 1 to 99, with 50 being average; higher numbers represent higher growth and lower numbers represent lower growth. An SGP of 75, for example, means the student's progress is higher than 75 percent and lower than 25 percent of the students in the state with similar prior test scores. This method works independently of MCAS performance levels. Therefore, all students, no matter the scores they earned on prior MCAS tests, have an equal chance to demonstrate growth at any of the 99 percentiles. School and district growth percentiles represent the growth of the median, or middle, student in the school or district. Most school and district median SGPs tend to range between 40 and 60. Schools outside of that range are showing less or more growth than the typical school in Massachusetts. For more information, go to <http://www.doe.mass.edu/mcas/growth/>.

### Teacher Retention

Teacher retention is the rate at which teachers responding to the TELL Massachusetts Survey indicated that they intend to remain teaching in their school. The estimated teacher retention variable was calculated from question 10.1 on the TELL Massachusetts Survey.

### Independent Variables Considered in the Models

**These variables represent those educational indicators that were accessible from the Massachusetts Department of Education.**

### School Characteristics

- **Mobility:** The percentage of entrants is calculated by dividing the number of entrants by the Average Daily Membership (ADM). The percentage of withdrawals is calculated by dividing the number of withdrawals by the ADM. The total mobility percentage is calculated by dividing the sum of entrants and withdrawals by the ADM.
- **Full-time Equivalent Teachers:** The number of full-time equivalent (FTE) teachers as reported by the school FTE is computed using each district's mean contract days and hours. Based on the data file submitted by the district, records for all teachers (job codes 201–206) were selected to determine the number of contract days and the number of hours per day worked by the majority of the teachers.
- **Student-Teacher Ratio:** Student-teacher ratio is computed by dividing the October count reported pupil membership by the teacher FTE.
- **Student Discipline:** The percent of reportable disciplinary actions by school.

### Teacher Characteristics

- **Percent White Educators:** The Percent White Educator is generated by dividing white educators as defined by the Massachusetts Department of Elementary and Secondary Education by the total amount of educators. This percentage includes all educators.
- **Teacher <33:** Represented as a binary unit, expressing the percent of teachers within a school of 32 years of age or less.
- **Percent Teachers Assigned to Content Area.**

### Student Characteristics

- **Special Education:** Percent of students at the school level participating in special education services.
- **Student Attrition:** Attrition rates measure the number of students lost from enrollment between two points in time. Attrition data are similar to cohort data.

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- Limited English Proficient: This designation encompasses all students identified as either non-English proficient or limited English proficient. Non-English proficient is defined as a student who speaks a language other than English and does not comprehend, speak, read, or write English. Limited English proficient is defined as a student who comprehends, speaks, reads, or writes some English but whose predominant comprehension or speech is in a language other than English. Districts must provide language services to all limited English proficient students.
  - Percent Free or Reduced-Price Lunch: Students qualifying for either the free or reduced-price lunch program. The *Federal National School Lunch Act* establishes eligibility for the reduced-price lunch program for families with incomes up to 185 percent of the federal poverty level (in 2005, this amount was \$35,798 for a family of four). Families with incomes up to 130 percent of the federal poverty level qualify for the free lunch program (in 2005 this amount was \$25,155 for a family of four).

## Appendix B. Student Achievement

### Statewide

Table B-1 presents information from the OLS model (1) where the outcome variable is the performance on the CPI, teaching conditions is a composite measure across all eight constructs, and the elementary, middle, and high school levels are combined. The unstandardized coefficient for the teaching

conditions composite mean indicates that for every 1-point change in the teaching conditions mean, the percentage of students score on the CPI would increase almost 5 percentage points. Changes in the teaching conditions composite mean of half a point or less are more common; however, to make model interpretation easier, the standard 1-point change in the mean is used. The table presents other factors the model identified as significant at the .05 level.

TABLE B-1. MODEL SUMMARY EXPLAINING STATEWIDE STUDENT ACHIEVEMENT (N=878)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	88.58	5.943		
Teaching Conditions Composite Mean	5.725	.967	.136	5.920	.000
Percent Free or Reduced Lunch	-.282	.039	-.175	-7.225	.000
Percent Special Education	-.069	.028	-.080	-2.441	.015
Percent English Language Learners	-.082	.041	-.052	-1.980	.048
Percent Student Attrition	.124	.087	.035	1.430	.153
Student-Teacher Ratio	-.129	.047	-.065	-2.782	.006
Percent of Teachers Assigned to Content Area	.038	.007	.135	5.799	.000
Full-Time Equivalent	-.218	.013	-.588	-16.708	.000

Adjusted R<sup>2</sup>=.575

## School Level

Models for elementary and middle school levels testing the association between the percent of students passing

the CPI and overall teaching conditions show positive and significant associations (See Tables B-2 and B-3). Middle and high schools failed to show significant differences between the two variables (Table B-4).

TABLE B-2. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL STUDENT ACHIEVEMENT COMPOSITE (N=545)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	78.816	3.281		24.023	.000
Percent Free and Reduced Lunch	-.183	.012	-.556	-15.893	.000
Percent Special Education	-.281	.052	-.156	-5.390	.000
ADM	-.011	.003	-.206	-4.082	.000
Percent Disciplined	-.605	.099	-.210	-6.079	.000
Teacher Full-Time Employee	.081	.022	.181	3.617	.000
Teaching Conditions Composite Mean	5.857	1.000	.156	5.857	.000
Adjusted R <sup>2</sup> =.640					

TABLE B-3. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL STUDENT ACHIEVEMENT COMPOSITE (N=169)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	-78.679	51.644		-1.523	.130
Percent Free and Reduced Lunch	-.257	.020	-.687	-12.802	.000
Percent Special Education	-.157	.095	-.073	-1.663	.098
Attendance Rate	1.920	.526	.191	3.650	.000
Student-Teacher Ratio	.255	.132	.078	1.926	.056
Percent Teachers Assigned	-.311	.082	-.165	-3.798	.000
Teaching Conditions Composite Mean	3.665	1.857	.084	1.973	.050
Adjusted R <sup>2</sup> =.751					

TABLE B-4. MODEL SUMMARY EXPLAINING HIGH SCHOOL ACHIEVEMENT COMPOSITE (N=164)

<b>Coefficients</b>					
<i>Variable</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig. (P)</i>
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
(Constant)	86.413	14.227		6.074	.000
Percent Free and Reduced Lunch	-.157	.036	-.351	-4.352	.000
Percent Special Education	-.201	.059	-.177	-3.421	.001
Percent Limited English Proficient	-.195	.069	-.159	-2.819	.005
Student Attrition	-.739	.128	-.322	-5.793	.000
Attendance Rate	.444	.120	.199	3.690	.000
Percent Disciplined	-.151	.070	-.120	-2.149	.033
Percent White Teacher	-.209	.060	-.223	-3.497	.001
Teaching Conditions Composite Mean	-2.063	2.236	-.039	-.923	.358

Adjusted R<sup>2</sup>=.708

## School Level by TELL Construct

Models for each school level that included the individual teaching conditions show that at the elementary school level, Community Involvement and Support and Managing Student Conduct have a significant and consistently positive association with student learning. Similarly, at the middle school level, Community Involvement and Support and

Managing Student Conduct have a significant and consistently positive association with student learning. Alternatively, at the middle school level (Table B-6), School Leadership is significantly but negatively associated with student learning. At the high school level, there are no statistically significant relationships between teaching conditions and student achievement. For complete models, see Tables B-5-B-7.

TABLE B-5. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL STUDENT ACHIEVEMENT (N=545)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	88.610	9.368		
Percent Free and Reduced Lunch	-.148	.015	-.449	-9.876	.000
Percent Special Education	-.269	.052	-.149	-5.212	.000
ADM	-.010	.003	-.198	-3.980	.000
Percent Disciplined	-.577	.101	-.200	-5.716	.000
Percent Teachers Assigned	-.255	.090	-.080	-2.833	.005
Percent White Teachers	.099	.034	.097	2.901	.004
Teacher Full-Time Equivalent	.077	.022	.172	3.461	.001
TELL: Community Support and Involvement Construct	4.625	1.535	.134	3.013	.003
TELL: Managing Student Conduct Construct	3.828	1.220	.131	3.139	.002
TELL: School Leadership Construct	-1.405	1.067	-.053	-1.317	.189
Adjusted R <sup>2</sup> =.653					

TABLE B-6. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL STUDENT ACHIEVEMENT (N=169)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	96.436	10.747		8.974	.000
Percent Free and Reduced Lunch	-.214	.024	-.573	-8.987	.000
Percent Special Education	-.207	.092	-.096	-2.244	.026
Student-Teacher Ratio	.349	.129	.107	2.698	.008
Percent Teachers Assigned	-.384	.078	-.203	-4.913	.000
TELL: Community Support and Involvement Construct	12.586	2.591	.348	4.857	.000
TELL: Managing Student Conduct Construct	3.183	1.602	.113	1.987	.049
TELL: School Leadership Construct	-7.711	2.091	-.236	-3.688	.000
Adjusted R <sup>2</sup> =.762					

TABLE B-7. MODEL SUMMARY EXPLAINING HIGH SCHOOL STUDENT ACHIEVEMENT (N=164)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	78.142	13.559		5.763	.000
Percent Free and Reduced Lunch	-.154	.038	-.342	-4.023	.000
Percent Limited English Proficient	-.138	.069	-.112	-1.988	.049
Student Attrition	-.771	.130	-.336	-5.910	.000
Attendance Rate	.507	.122	.228	4.170	.000
Percent Disciplined	-.221	.070	-.176	-3.173	.002
Percent White Teachers	-.186	.061	-.199	-3.039	.003
TELL: Professional Development Construct	-3.276	1.870	-.085	-1.752	.082
Adjusted R <sup>2</sup> =.692					

## Appendix C. Student Growth Indicator

### Statewide

We found no significant relationship at the state level between the working conditions composite score and a school's student

growth percentile, demonstrated by the limited amount of adjusted variance explained by the model ( $r$  square), using as many independent variables as shown, and the apparent non-significance of the working conditions composite ( $p=.383$ ).

TABLE C-1 MODEL SUMMARY EXPLAINING STATEWIDE STUDENT GROWTH PERCENTILE (N=839)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	-16.855	31.201		
Percent Free and Reduced Lunch	-.118	.023	-.294	-5.075	.000
Percent Special Education	.099	.073	.057	1.353	.176
Percent Limited English Proficient	.156	.047	.170	3.300	.001
Student Attrition	-.009	.068	-.006	-.138	.891
Percent Mobility	-.042	.043	-.036	-.988	.324
Attendance Rate	1.045	.327	.167	3.193	.001
Student-Teacher Ratio	-.011	.158	-.003	-.068	.946
Average Class Size	.090	.088	.038	1.027	.305
Average Daily Membership	-.001	.004	-.038	-.347	.729
Percent of Disciplinary Actions	-.037	.083	-.022	-.447	.655
Teacher Age < 33	.083	.041	.078	1.999	.046
Percent of Teachers Assigned to Content Area	-.215	.086	-.103	-2.506	.012
Percent White Teachers	-.119	.048	-.111	-2.473	.014
Full-Time Equivalents	.000	.032	.000	.004	.996
TELL Composite	1.402	1.608	.031	.872	.383

Adjusted R<sup>2</sup>=.096



## School Level

Individual models for each school level testing the relationship between student growth and overall perceived teaching

conditions show that the composite teaching conditions measure is not significant at any levels. See Tables C-2–C-4 for models at each school level.

TABLE C-2. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL STUDENT GROWTH PERCENTILE COMPOSITE (N=510)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	-23.450	68.970		
Percent Free and Reduced Lunch	-.161	.033	-.413	-4.872	.000
Percent Limited English Proficient	.146	.056	.171	2.582	.010
Student Attrition	.168	.113	.086	1.484	.138
Mobility	-.015	.049	-.014	-.305	.760
Attendance Rate	.792	.727	.070	1.088	.277
Percent Disciplined	.391	.201	.116	1.946	.052
Teaching Conditions Composite Mean	1.455	2.018	.032	.721	.471

Adjusted R<sup>2</sup>=.060

TABLE C-3. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL STUDENT GROWTH PERCENTILE COMPOSITE (N=169)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	-46.371	104.730		-.443	.659
Percent Free and Reduced Lunch	-.018	.051	-.053	-.352	.725
Percent Special Education	-.071	.178	-.036	-.397	.692
Percent Limited English Proficient	.195	.118	.198	1.652	.101
Student Attrition	-.098	.077	.105	-1.272	.205
Mobility	-.106	.090	-.100	-1.178	.241
Attendance Rate	1.297	1.073	.142	1.208	.229
Student-Teacher Ratio	-.571	.534	.130	-1.068	.287
Average Class Size	.105	.290	.036	.362	.718
ADM	.007	.009	.187	.824	.411
Percent Disciplined	-.232	.181	-.165	-1.279	.203
Teacher Age < 33	.091	.086	.100	1.060	.291
Percent Teacher Assigned	.001	.187	.001	.006	.995
Percent White Teacher	-.245	.090	-.303	-2.736	.007
Full-Time Equivalents	-.053	.071	-.158	-.747	.456
Teaching Conditions Composite Mean	4.088	3.238	.103	1.263	.209

Adjusted R<sup>2</sup>=.101

TABLE C-4. MODEL SUMMARY EXPLAINING HIGH SCHOOL STUDENT GROWTH PERCENTILE COMPOSITE (N=160)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	65.283	49.666		1.314	.191
Percent Free and Reduced Lunch	-.089	.063	-.190	-1.398	.164
Percent Special Education	.032	.132	.028	.242	.809
Percent Limited English Proficient	.090	.126	.073	.715	.476
Student Attrition	-.502	.267	-.204	-1.880	.062
Mobility	.088	.251	.049	.350	.726
Attendance Rate	.600	.576	.148	1.041	.300
Student-Teacher Ratio	-.504	.346	-.136	-1.458	.147
ADM	.006	.007	.254	.847	.399
Percent Disciplined	-.049	.141	-.039	-.344	.731
Teacher Age < 33	.067	.100	.070	.673	.502
Percent Teacher Assigned	-.535	.150	-.411	-3.563	.000
Percent White Teacher	-.117	.122	-.119	-.959	.339
Teacher Full-Time Equivalent	-.045	.060	-.206	-.758	.450
Teaching Conditions Composite Mean	-1.490	4.410	-.028	-.338	.736

Adjusted R<sup>2</sup>=.173

## School Level by TELL Construct

When testing the association between each teaching condition and student growth at each school level and specific to construct areas assessed on TELL Massachusetts, models indicate that at the elementary school level, Managing Student Conduct is positively related to student academic growth and School Leadership is negatively associated with academic

growth. At the middle school level, Time is positively related to the student growth indicator, and School Leadership demonstrates a negative relationship. At the high school level, Time and Professional Development are negatively associated with the student growth indicator. Instructional Practices and Support are positively associated with student growth performance. See Tables C-5–C-7 for school-level models showing significant teaching factors.

TABLE C-5. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL STUDENT GROWTH PERCENTILE (N=510)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	53.353	5.104		
Percent Free and Reduced Lunch	-.126	.026	-.322	-4.870	.000
Percent Limited English Proficient	.163	.055	.191	2.954	.003
TELL: Time Construct	-.153	2.190	-.004	-.070	.944
TELL: Managing Student Conduct	5.550	2.398	.160	2.315	.021
TELL: School Leadership Construct	-4.668	2.175	-.147	-2.146	.032

Adjusted R<sup>2</sup>=.063

TABLE C-6. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL STUDENT GROWTH PERCENTILE (N=171)

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
	(Constant)	59.171	8.711		
Percent White Teacher	-.259	.060	-.314	-4.307	.000
TELL: Time Construct	10.542	3.500	.310	3.012	.003
TELL: School Leadership Construct	-4.303	3.103	-.142	-1.387	.167

Adjusted R<sup>2</sup>=.116

TABLE C-7. MODEL SUMMARY EXPLAINING HIGH SCHOOL STUDENT GROWTH PERCENTILE (N=160)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	20.984	50.834		.413	.680
Percent Free and Reduced Lunch	.001	.079	.002	.014	.989
Percent Special Education	.030	.132	.026	.226	.821
Percent Limited English Proficient	.109	.127	.089	.855	.394
Student Attrition	-.468	.258	-.190	-1.817	.071
Mobility	.076	.245	.042	.309	.757
Attendance Rate	.307	.564	.075	.543	.588
Student-Teacher Ratio	-.433	.353	-.117	-1.229	.221
ADM	.004	.007	.164	.565	.573
Percent Disciplined	-.078	.142	-.063	-.551	.583
Teacher Age < 33	.066	.100	.069	.662	.509
Percent Teacher Assigned	-.386	.149	-.296	-2.585	.011
Percent White Teacher	-.080	.121	-.082	-.663	.508
Teacher Full-Time Equivalents	-.046	.058	-.207	-.787	.433
TELL: Time Construct	-11.420	5.700	-.244	-2.004	.047
TELL: Facilities and Resources Construct	-.435	3.035	-.013	-.143	.886
TELL: Community Support and Involvement Construct	1.348	7.504	.028	.180	.858
TELL: Managing Student Conduct Construct	8.052	4.449	.207	1.810	.072
TELL: Teacher Leadership Construct	-4.961	10.767	-.119	-.461	.646
TELL: School Leadership Construct	-7.547	9.242	-.200	-.817	.416
TELL: Professional Development Construct	-13.895	5.666	-.342	-2.452	.015
TELL: Instructional Practices and Support	42.509	11.938	.640	3.561	.001
Adjusted R <sup>2</sup> =.243					

## Appendix D. Teacher Retention

### Statewide

Table D-1 presents OLS model (3). The model demonstrates that as teachers view their school's teaching

conditions more positively, the teacher retention rate increases. Table D-1 presents other factors the model identified as significant as well.

TABLE D-1. MODEL SUMMARY EXPLAINING STATEWIDE ESTIMATED TEACHER RETENTION (N=960)					
Variable	Coefficients			t	Sig. (P)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	.263	.046		5.764	.000
TELL Composite	.213	.013	.446	16.069	.000
Percent Free and Reduced Lunch	-.001	.000	-.256	-9.040	.000
Percent Limited English Proficient	-.001	.000	-.059	-1.996	.046
Student-Teacher Ratio	.001	.001	.039	1.293	.196
Average Class Size	.002	.001	.067	2.381	.017
Average Daily Membership	-.001	.000	-.185	-2.268	.024
Teacher Age <33	-.001	.000	-.132	-4.667	.000
Full-Time Equivalent	.001	.000	.237	2.948	.003
Adjusted R <sup>2</sup> =.326					

## School Level

perceive there are better teaching conditions. Tables D-2–D-4 present significant coefficients.

Teacher retention is higher at all school levels where teachers

TABLE D-2. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL ESTIMATED TEACHER RETENTION COMPOSITE (N=619)					
Variable	Coefficients			t	Sig. (P)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	.033	.139		.240	.811
Percent Special Education	-.001	.001	-.095	-2.660	.008
Percent Limited English Proficient	-.001	.000	-.153	-3.901	.000
Student-Teacher Ratio	.003	.002	.075	1.991	.047
Average Daily Membership	.000	.000	-.179	-2.491	.013
Percent Disciplined	-.009	.001	-.238	-6.121	.000
Teacher Age <33	-.001	.000	-.080	-2.207	.028
Percent Teacher Assigned	.002	.001	.061	1.749	.081
Teacher Full-Time Equivalent	.002	.000	.275	3.993	.000
Teaching Conditions Composite Mean	.211	.016	.437	12.873	.000
Adjusted R <sup>2</sup> =.350					

TABLE D-3. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL ESTIMATED TEACHER RETENTION COMPOSITE (N=171)					
Variable	Coefficients			t	Sig. (P)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	-.076	.134		-.569	.570
Percent Free and Reduced Lunch	-.002	.000	-.409	-5.076	.000
Percent Limited English Proficient	.002	.001	.177	2.201	.029
Mobility	.002	.001	.180	3.033	.003
Percent White Teacher	.002	.001	.202	3.011	.003
Teaching Conditions Composite Mean	.198	.028	.411	7.048	.000
Adjusted R <sup>2</sup> =.458					

TABLE D-4. MODEL SUMMARY EXPLAINING HIGH SCHOOL ESTIMATED TEACHER RETENTION COMPOSITE (N=170)

<b>Coefficients</b>					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	.282	.085		3.313	.001
Percent Free and Reduced Lunch	-.002	.000	-.525	-6.040	.000
Percent Limited English Proficient	.002	.001	.218	2.914	.004
Student-Teacher Ratio	.004	.001	.169	2.663	.009
Percent Disciplined	.002	.001	.243	3.213	.002
Teaching Conditions Composite Mean	.193	.030	.412	6.478	.000

Adjusted R<sup>2</sup>=.324

### School Level by TELL Construct

In elementary schools, the Teacher Leadership and School Leadership constructs are associated with more teachers staying in a school. At the middle school level, Teacher Leadership demonstrates a positive association with teacher

retention, and Time is negatively associated with teacher retention. At the high school level, School Leadership is related to an increase in retention. See Tables D-5–D-7 for full models.

TABLE D-5. MODEL SUMMARY EXPLAINING ELEMENTARY SCHOOL ESTIMATED TEACHER RETENTION (N=619)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	.361	.045		8.055	.000
Percent Special Education	-.001	.001	-.098	-2.812	.005
Percent Limited English Proficient	-.001	.000	-.144	-3.766	.000
Average Daily Membership	.000	.000	-.132	-2.101	.036
Percent Disciplined	-.009	.001	-.242	-6.341	.000
Teacher Age < 33	-.001	.000	-.106	-3.139	.002
Teacher Full-Time Equivalent	.001	.000	.236	3.829	.000
TELL: Facilities and Resources Construct	.021	.014	.059	1.483	.138
TELL: Teacher Leadership Construct	.098	.030	.257	3.290	.001
TELL: School Leadership Construct	.069	.025	.202	2.784	.006
Adjusted R <sup>2</sup> =.382					



TABLE D-6. MODEL SUMMARY EXPLAINING MIDDLE SCHOOL ESTIMATED TEACHER RETENTION (N=171)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	-.191	.117		-1.624	.106
Percent Limited English Proficient	.000	.001	-.004	-.061	.952
Mobility	.003	.001	.218	3.818	.000
Teacher Age < 33	-.002	.001	-.156	-2.565	.011
Percent White Teacher	.003	.001	.280	3.981	.000
TELL: Time Construct	-.088	.033	-.218	-2.642	.009
TELL: Teacher Leadership Construct	.276	.033	.702	8.466	.000
Adjusted R <sup>2</sup> =.499					

TABLE D-7. MODEL SUMMARY EXPLAINING HIGH SCHOOL ESTIMATED TEACHER RETENTION (N=170)

Coefficients					
Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	.358	.071		5.076	.000
Percent Free and Reduced Lunch	-.002	.000	-.583	-6.615	.000
Percent Limited English Proficient	.002	.001	.221	2.955	.004
Student-Teacher Ratio	.004	.001	.183	2.854	.005
Percent Disciplined	.002	.001	.205	2.760	.006
TELL: Time Construct	.060	.034	.156	1.751	.082
TELL: School Leadership Construct	.110	.028	.340	3.893	.000
Adjusted R <sup>2</sup> =.355					

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## About the New Teacher Center

New Teacher Center focuses on improving student learning by accelerating the effectiveness of new teachers. NTC partners with states, school districts, and policymakers to design and implement systems that create sustainable, high-quality mentoring and professional development; build leadership capacity; work to enhance teaching conditions; improve retention; and transform schools in vibrant learning communities where all students succeed.



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