



North Carolina's

Teacher Working Conditions Initiative

Statistical Models Examining the Connection between Teacher Working Conditions, Student Achievement and Teacher Retention

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Statistical Models on Student Achievement

Models for student achievement examine the relationship between teaching conditions, other school, teacher, and student factors, and student achievement, by school level (elementary, middle, and high). For these models, dependent variables were regressed onto critical student-, teacher- and school-level factors and teaching conditions factors.

Because all variables - student achievement, teacher attrition, school, teacher, and student factors, and teaching conditions domain averages were aggregated at the school level, Ordinary Least Square (OLS) regression was used. Hierarchical linear modeling (HLM) is frequently used in analyzing student achievement to account for data being nested (in classes with teachers, nested in schools, nested in districts, etc.) and therefore not independent of each other. Although the NC Teaching Conditions analysis uses student and teacher level data, these data have been aggregated to the school level. For example, students' free and reduced lunch status is reported as a school-level average. This decision was guided by the fact that the dependent variables employed in these analyses are measured at the school level. The use of school-level data versus students-level data linked to teachers results from the decision to ensure the anonymity of all respondents to the NC Teaching Conditions Survey. This decision, while potentially limiting some of the types of analyses that could be calculated using this data, promotes high response rates and minimizes threats to internal validity influenced by teacher mistrust in assurances of confidentiality.

The generic linear regression model in these models can be explained as: dependent variable (Composite Performance Index) Y_i is a linear combination of the parameters. For example, in a simple linear regression used to model N data points (observations) there is one independent variable: x_i , and two parameters, β_0 and β_1 :

$$Y_i = \beta_0 + \beta_1 (\text{Student}_i) + \beta_2 (\text{School}_i) + \beta_3 (\text{Teacher}_i) + \beta_4 (\text{Teaching Conditions}_i) + \epsilon_i, \text{ for } i = 1, \dots, N$$

Where Y_i is the dependent variable, β_0 is the constant, β_{1-4} are the blocks of independent variables and ϵ_i is the error term.

All listed independent variables were originally entered in the model. Variables that did not contribute to the model were removed until the model explaining the most variance (adjusted R-squared) was created. Independent variables in the final model that are not statistical significant still contribute to the amount of variance explained in the model and others not reported were considered.

Independent variables were entered together, without the use of stepwise or other entry methods. Results were then standardized and converted to a 0 to 100 scale to aid in interpretation of results.

R-Square changed represents the minimum amount of variance that can be explained by the teaching conditions variables by providing the difference between the model including student, teacher and school characteristics blocks and the model including those variables with the addition of teaching conditions factor(s).

Independent Variables Considered in the Models

Student Variables

- ***Percentage Limited English Proficient***: Indicates the percentage of enrolled students who are limited English proficient, defined as “students for whom English is a second language and who are not at (LEP) grade level in reading and writing English.” Source: North Carolina Department of Public Instruction (NCDPI) Accountability Services Division, Reporting Section, “Reports of Disaggregated State, School System (LEA), & School Performance Data for 2007-08.”
- ***Percentage Free- and Reduced-Price Lunch Eligible***: Indicates the percentage of enrollment who were identified for 2007-08 AYP calculations in accordance with a Memorandum of Agreement between the Child Nutrition Services Section and the Division of Accountability Services dated November 19, 2007. Source: NCDPI, Accountability Services Division, Reporting Section, “Reports of Disaggregated State, School System (LEA), & School Performance Data for 2007-08.”
- ***Percentage Minority Students***: Indicates the percentage of students in racial or ethnic categories other than white for reporting purposes. Racial/ethnic categories used are as follows: White, Black, Hispanic, American Indian, Asian/Pacific Islander, and Multiracial. Source: NCDPI, Accountability Services Division, Reporting Section, “Reports of Disaggregated State, School System (LEA), & School Performance Data for 2007-08.”

Teacher Variables

- ***Percentage of Teachers Fully Licensed in Teaching Assignment***: Percentage of teachers are “only those classroom teachers with clear initial or clear continuing licenses. A classroom teacher is defined by the NC Department of Public Instruction as anyone in purpose codes beginning with 51, 52, or 53 and object codes 121, 123, 124, or 128.” Source: NCDPI, Human Resource Management Division, Licensure Section, Licensure & Salary Certification Files, March 2008.
- ***Percentage of Teacher Turnover***: The percentage of teachers School-level turnover rates are derived from school payroll data. All classroom teachers employed in a school during March of the previous year, but not employed in the same system as a classroom teacher

during March of the current year, are included in the school's turnover statistics. Percentages reported on the 2007-08 Report Cards are based upon the classroom teachers employed in March 2007 and their employment status in March 2008. Source: NCDPI, Human Resource Management Division, Licensure Section, Licensure & Salary Certification Files, March 2008.

- ***Percentage of Teachers Holding a Lateral Entry License:*** Lateral Entry Licenses are issued to individuals who hold at least a bachelor's degree from a regionally accredited institution with the equivalent of a college major in the area they are assigned to teach. Individuals employed on lateral entry licenses must be affiliated with colleges and universities with approved teacher education programs to complete prescribed course work. The first lateral entry license is issued for two years. It may be re-issued for an additional year. Individuals employed on lateral entry licenses must complete at least six semester hours of course work each year and satisfy Praxis II testing requirements before the end of the second year. Source: NCDPI, Human Resource Management Division, Licensure Section, Licensure & Salary Certification Files, March 2008.
- ***Percentage of Teachers with an Advanced Degree:*** The percentage of teachers holding a degree beyond a bachelor's, master's, advanced or doctoral degree. Teachers with advanced degrees outside of the field of education are not being included in this percentage. The licensure file does not capture non-education advanced degrees. If a classroom teacher is listed as having more than one type of license, the highest degree held is reported. Source: NCDPI, Human Resource Management Division, Licensure Section, Licensure & Salary Certification Files, March 2008.
- ***Percentage of Minority Educators:*** Indicates the percentage of educators in racial or ethnic categories other than white for reporting purposes. Racial/ethnic categories used are as follows: White, Black, Hispanic, American Indian, Asian/Pacific Islander, and Multiracial. Source: NCDPI data as of October 1, 2007.

School Variables

- ***Average Daily Membership:*** Indicates attendance at the school defined by "The number of days a student is in membership at a school divided by the number of days in a school month or school year. Source NCDPI, Financial & Business Services, School Business Division, Principal's Monthly Report, 2007-08.
- ***Student/Teacher Ratio:*** The October 1 student enrollment to the total number of teachers. Source: NCDPI data as of October 1, 2007.
- ***Reported Act Rate:*** The number of acts of crime and violence reported for a school. North Carolina defines 17 acts as "reported acts," including possession of a weapon,

assault on school personnel, bomb threat, and death by other than natural causes. Source: NCDPI data as of October 1, 2007.

- ***Average Copyright Year of Books***: The average of based on the last copyright date of each book in the school media center or library. Source: NCDPI, Accountability & Technology Services, Instructional Technologies Division, Technology Planning & Support Section, Annual Media & Technology Report, 2007.
- ***Student/Book Ratio***: Schools are asked to provide the total number of books in their media center or library collection. Periodicals, software titles, videotapes, and electronic books may not be included. Schools are directed to count no more than five (5) copies of a single title and to count encyclopedias as one book. This total is divided by the final Average Daily Membership (ADM) for the school year to produce the average number of books per student. Source: NCDPI, Accountability & Technology Services, Instructional Technologies Division, Technology Planning & Support Section, Annual Media & Technology Report, 2007.
- ***Student/Instructional Computer Ratio***: Schools are asked to provide a count of the total number of computers that they use for student instruction in their media center/library, general/academic classrooms, general/academic labs, vocational education classrooms, vocational education labs, and other areas. This total is divided by the final average daily membership (ADM) for the school year to produce the average number of students per instructional computer. Source: NCDPI, Accountability & Technology Services, Instructional Technologies Division, Technology Planning & Support Section, Annual Media & Technology Report, 2007.
- ***Percentage of Classrooms with Internet Connectivity***: Schools are asked to provide the total number of Internet-connected classrooms in their school. This total of Internet-connected classrooms is divided by the total number of classrooms in the school to produce the percentage of classrooms connected to the Internet. Source: NCDPI, Accountability & Technology Services, Instructional Technologies Division, Technology Planning & Support Section, Annual Media & Technology Report, 2007.

Teaching, Learning and Leading Conditions

- ***Time***: The mean of 5 questions from the time section, including Q2.1a, Q2.1b, Q2.1c, Q2.1d and Q2.1e. Source: NC Teaching Conditions Survey.
- ***Facilities and Resources***: The mean of 8 questions from the facilities and resources section, including Q3.1a, Q3.1b, Q3.1c, Q3.1d, Q3.1e, Q3.1f, Q3.1g and Q3.1h. Source: NC Teaching Conditions Survey

- **Decision Making:** The mean of 8 questions from the educator leadership section, including Q4.3a, Q4.3b, Q4.3c, Q4.3d, Q4.3e, Q4.3f, Q4.3g and Q4.3h. Source: NC Teaching Conditions Survey.
- **Leadership:** The mean of 10 questions from both the school leadership and educator leadership sections, including Q5.1a, Q5.1c, Q5.1e, Q5.1f, Q5.1h, Q5.1j, Q5.1l, Q5.1m, Q5.1n and Q5.3e. Source: NC Teaching Conditions Survey.
- **Professional Development:** The mean of 5 questions from the professional development section, including Q6.1a, Q6.1b, Q6.1c, Q6.1d and Q6.1e. Source: NC Teaching Conditions Survey.

Dependent Variables

- **Performance Composite:** The performance composite is a percentage per school that “summarizes the performance of students in the school, for example, what percent are performing at or above grade level (Achievement Level III) in subjects and courses included in the accountability model.” Source: NCDPI, Accountability Services Division, Reporting Section, “2007-08 ABC/AYP Report.”
- **High Growth Performance:** Each year, schools in North Carolina may receive several designations based on their performance on the state’s ABCs tests. These designations are awarded on the basis of the percentage of students performing at grade level and on whether the school attained the ABCs growth standards. A school demonstrating high growth performance has a c-ratio greater than or equal to 1.5 and has made expected growth. Source: NCDPI, Accountability Services Division, Reporting Section, “2007-08 ABC/AYP Report.”
- **Teacher Turnover:** The percentage of teachers School-level turnover rates are derived from school payroll data. All classroom teachers employed in a school during March of the previous year, but not employed in the same system as a classroom teacher during March of the current year, are included in the school’s turnover statistics. Percentages reported on the 2007-08 Report Cards are based upon the classroom teachers employed in March 2007 and their employment status in March 2008. Source: NCDPI, Human Resource Management Division, Licensure Section, Licensure & Salary Certification Files, March 2008. For more information, see <http://www.ncreportcards.org/src/DatasourceGuide.pdf>
- **Estimated Teacher Retention:** Estimated teacher retention is the percentage of teachers in a school indicating they will continue teaching in their school based on the following survey item. “Which BEST DESCRIBES your professional intentions in the next 2 years?” a. Continue teaching at my current school, b. Continue teaching in my district, c. Continue teaching in this state, d. Leave teaching for another position in education

(administration, etc.), e. Leave teaching for personal reasons (personal, family, health, etc.), f. Retire from teaching, g. Leave teaching for another reason. Source: NC Teaching Conditions Survey, <http://ncteachingconditions.org/reports/>

Statistical Models for Student Learning

For these models, school-level achievement performance composite scores were regressed onto critical student-, teacher- and school-level factors and teaching conditions factors.

Statistical Model Explaining Elementary Composite Performance

Model	Unstandardized Coefficients		Standardized Coefficients	T	Statistical Significance
	B	Standard Error	Beta		
(Constant)	94.579	10.487		9.019	.000
Free- and Reduced-Price Lunch Eligible	-.322	.011	-.580	-28.336	.000
Limited English Proficiency	.052	.021	.043	2.514	.012
Minority Students	-.099	.014	-.208	-6.892	.000
Teacher Turnover	-.081	.030	-.042	-2.672	.008
Teachers Fully Licensed in Teaching Assignment	-.249	.102	-.074	-2.439	.015
Teachers Licensed by Lateral Entry	-.463	.129	-.110	-3.591	.000
Minority Educators	-.041	.020	-.051	-2.048	.041
Reported Acts	-1.879	.244	-.113	-7.688	.000
Time Factor	1.801	.657	.057	2.739	.006
Facilities and Resources Factor	2.841	.759	.077	3.744	.000
Decision Making Factor	1.639	.890	.040	1.841	.066
Leadership Factor	2.634	.651	.093	4.046	.000
Professional Development Factor	-3.846	.807	-.107	-4.768	.000

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.872	.761	.758	6.60503	.022

Statistical Model Explaining Middle School Composite Performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Standard. Error	Beta		
(Constant)	76.084	4.257		17.873	.000
Free- and Reduced-Price Lunch Eligible	-.441	.019	-.695	-23.206	.000
Teacher Turnover	-.103	.039	-.058	-2.645	.008

Teachers with Advanced Degrees	.079	.033	.054	2.378	.018
Minority Educators	-.113	.017	-.181	-6.813	.000
Student Teacher Ratio	-.329	.136	-.058	-2.419	.016
Reported Act Rate	-.709	.298	-.049	-2.380	.018
Facilities and Resources Factor	5.017	1.022	.154	4.910	.000
Leadership Factor	3.197	.822	.118	3.890	.000
Professional Development Factor	-3.835	1.115	-.113	-3.439	.001

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.908	.824	.820	5.46921	.027

Statistical Model Explaining High School Composite Performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Standard Error	Beta		
(Constant)	-86.151	129.973		-.663	.508
Free- and Reduced-Price Lunch Eligible	-.142	.027	-.241	-5.164	.000
Minority Students	-.179	.021	-.408	-8.571	.000
Teachers Licensed by Lateral Entry	-.204	.073	-.113	-2.793	.006
Average Daily Membership	.006	.001	.291	7.938	.000
Student Teacher Ratio	-.462	.183	-.101	-2.518	.012
Reported Acts Rate	-1.600	.363	-.139	-4.402	.000
Average Book Copyright	.071	.066	.036	1.086	.278
Time Factor	3.781	1.472	.127	2.568	.011
Facilities and Resources Factor	3.164	1.379	.104	2.295	.022
Leadership Factor	2.537	1.255	.095	2.021	.044
Professional Development Factor	-1.537	1.677	-.043	-.917	.360

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.820	.673	.663	6.56579	.054

Statistical Models for Student Achievement Growth

For the teacher Working Conditions Models for Academic Growth logistic regression models were calculated by school level to analyze the probability of exceeding growth expectations set by the state of North Carolina given teachers' ratings of working conditions and other student, teacher, and school factors. A regression model was used because, as noted previously, they allow the dependent variable to be modeled as a function of one or more independent variables. However, a logistic model was employed because the outcome this analysis predicts is binary in nature (i.e., the outcome is one of only two potential outcomes: either growth was met or growth was not met).

Maximum likelihood estimation is applied in logistic regression after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). As shown below, logistic regression estimates the odds of a certain event occurring, in this case, making growth.

Logit (p_i) = $\ln(p_i / 1-p_i) = \beta_0 + \beta_1 x_{1,i} + \dots + \beta_k x_{k,i}$ where p = probability of meeting or exceeding growth expectations

Because p represents the probability of making growth, coefficients of variables that are greater than one indicate that these variables contribute to this outcome, while variables that have coefficients less than one are seen as negatively impacting this outcome.

Data included in logistic regression models were assessed prior to their inclusion to ensure all necessary assumptions were met.

In our analyses, we have converted all odds to probabilities and reported them as such. For example, assume the log odds of an event occurring was 0.59. To convert the log odds to an odd, one raises e to the odd so that $\text{odds} = e^{(0.59)} = 1.80$. Then the odds is converted into a probability as $p = 1.80 / (1+1.80) = 0.643$ or 64.3%

Statistical Model Explaining Elementary High Growth Performance

	B	S.E.	Wald	df	Sig.	Exp(B)
Limited English Proficient	.021	.007	8.716	1	.003	1.021
Minority Students	-.017	.004	15.394	1	.000	.983
Teacher Turnover	-.012	.010	1.545	1	.214	.988
Minority Educator	.009	.006	2.117	1	.146	1.009
Reported Act Rate	-.335	.175	3.672	1	.055	.715
Time Factor	.422	.219	3.718	1	.054	1.525
Facilities & Resources Factor	.369	.249	2.190	1	.139	1.446
Decision Making Factor	-.300	.297	1.023	1	.312	.741
Leadership Factor	.478	.215	4.957	1	.026	1.613
Professional Development Factor	-.331	.269	1.510	1	.219	.719
Constant	-1.114	.834	1.784	1	.182	.328

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1399.531	.064	.090

Statistical Model Explaining Middle School High Growth Performance

	B	S.E.	Wald	df	Sig.	Exp(B)
Free- and Reduced-Lunch Eligible	-.032	.007	18.218	1	.000	.969
Limited English Proficiency	.022	.018	1.461	1	.227	1.022
Teacher Turnover	-.037	.016	5.619	1	.018	.963
Student-Teacher Ratio	-.137	.061	5.033	1	.025	.872
Student-Book Ratio	.024	.015	2.438	1	.118	1.024
Facilities & Resources Factor	1.397	.420	11.057	1	.001	4.045
Leadership Factor	.494	.328	2.265	1	.132	1.639
Professional Development Factor	-.700	.453	2.383	1	.123	.497
Constant	-.816	1.720	.225	1	.635	.442

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
505.271	.160	.215

Statistical Model Explaining High School High Growth Performance

	B	S.E.	Wald	df	Sig.	Exp(B)
Minority Students	-.019	.011	2.723	1	.099	.981
Minority Educators	.024	.016	2.450	1	.118	1.025
Student-Teacher Ratio	-.042	.030	1.898	1	.168	.959
Reported Act Rate	-.245	.159	2.382	1	.123	.782
Student-Computer Ratio	.071	.038	3.565	1	.059	1.074
Facilities & Resources Factor	1.350	.580	5.417	1	.020	3.857
Leadership Factor	.923	.472	3.821	1	.051	2.516
Professional Development Factor	-.864	.613	1.988	1	.159	.421
Constant	-6.355	1.849	11.807	1	.001	.002

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
314.542	.064	.110

Statistical Models for Future Employment Plans

The models on estimated teacher retention examine the relationship between student, school, teacher characteristics and teaching conditions and the proportion of teachers responding to the NC Teaching Conditions Survey within a school that they want to “Continue teaching at my current school “ based on the following item. “Which BEST DESCRIBES your professional intentions in the next 2 years?” a. Continue teaching at my current school, b. Continue teaching in my district, c. Continue teaching in this state, d. Leave teaching for another position in education (administration, etc.), e. Leave teaching for personal reasons (personal, family, health, etc.), f. Retire from teaching, g. Leave teaching for another reason.

The generic linear regression model in these models can be explained as: the dependent variable Y_i is a linear combination of the parameters. For example, in a simple linear regression used to model N data points (observations) there is one independent variable: x_i , and two parameters, β_0 and β_1 :

$$Y_i = \beta_0 + \beta_1 (\text{Student}_i) + \beta_2 (\text{School}_i) + \beta_3 (\text{Teacher}_i) + \beta_4 (\text{Teaching Conditions}_i) + \varepsilon_i, \text{ for } i = 1, \dots, N$$

Where Y_i is the school-level percentage of “hard stayers”, β_0 is the constant, β_{1-4} are the blocks of independent variables and ε_i is the error term.

The same blocks of student, school, teacher and teaching conditions variables employed in the student learning models were utilized for the estimated retention models (CPI was used as a school variable in lieu of the hard stayer variable. See Appendix C for variable definitions).

For each model all independent variables were originally entered. Non-significant variables were deleted until the model with the highest variance explained (adjusted R-squared) was found. Therefore, not all independent variables listed above are included in the final models presented.

Independent variables were entered together, without the use of stepwise or other entry methods. Results were then standardized and converted to a 0 to 100 scale to aid in interpretation of results.

R-Square changed represents the minimum amount of variance that can be explained by the teaching conditions variables by providing the difference between the model including student, teacher and school characteristics blocks and the model including those variables with the addition of teaching conditions factor(s).

Statistical Model Explaining Elementary School Future Employment Plans

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Std. Error	Beta		
(Constant)	-10.622	4.332		-2.452	.014
Minority Student	-.126	.018	-.228	-7.063	.000
Teachers with Advanced Degrees	.059	.033	.037	1.776	.076
Minority Educators	-.053	.029	-.057	-1.794	.073
Student-Teacher Ratio	-.033	.023	-.030	-1.447	.148
Student-Instructional Computer Ratio	.606	.215	.058	2.824	.005
Facilities and Resources Factor	2.515	1.083	.059	2.322	.020
Decision Making Factor	2.924	1.400	.062	2.088	.037
Leadership Factor	15.417	.992	.464	15.535	.000

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.688 ^d	.473	.470	11.60146	.267

Statistical Model Explaining Middle School Future Employment Plans

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-225.833	276.124		-.818	.414
Free- and Reduced-Price Lunch Eligible	-.053	.036	-.073	-1.463	.144
Limited English Proficiency	.070	.092	.031	.757	.449
Minority Student	-.090	.043	-.162	-2.093	.037
Teachers Fully Licensed in Assignment Area	.199	.078	.108	2.544	.011
Minority Educator	-.103	.053	-.144	-1.964	.050
Average Book Copyright	.107	.138	.027	.776	.438
Time Factor	4.160	1.706	.120	2.439	.015
Facilities and Resources Factor	-1.436	1.712	-.039	-.839	.402
Leadership Factor	14.924	1.518	.487	9.828	.000

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.748 ^d	.560	.551	9.80971	.279

Statistical Model Explaining High School Future Employment Plans

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Std. Error	Beta		
(Constant)	201.298	174.848		1.151	.250
Free- and Reduced-Price Lunch Eligible	-.041	.036	-.064	-1.154	.249
Limited English Proficient	.189	.117	.070	1.616	.107
Minority Student	-.113	.030	-.238	-3.823	.000
Teachers Licensed through Lateral Entry Program	-.208	.107	-.106	-1.953	.052
Teachers with Advanced Degrees	-.078	.071	-.050	-1.098	.273
Average Daily Membership	.003	.001	.133	3.006	.003
Reported Act Rate	-.998	.490	-.080	-2.036	.043
Student-Book Ratio	-.065	.049	-.055	-1.340	.181
Average Book Copyright	-.097	.088	-.045	-1.094	.275
Time Factor	4.310	2.063	.132	2.089	.037
Facilities and Resources Factor	3.274	1.865	.098	1.755	.080
Decision Making Factor	8.416	3.018	.175	2.789	.006
Leadership Factor	8.692	1.854	.300	4.687	.000
Professional Development Factor	-5.061	2.252	-.131	-2.247	.025

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.716	.513	.492	8.73384	.239

Statistical Models for Actual Teacher Attrition

The models on estimated teacher retention examine the relationship between student, school, teacher characteristics and teaching conditions and the percentage of teachers. School-level turnover rates are derived from school payroll data. All classroom teachers employed in a school during March of the previous year, but not employed in the same system as a classroom teacher during March of the current year, are included in the school's turnover statistics. Percentages reported on the 2007-08 Report Cards are based upon the classroom teachers employed in March 2007 and their employment status in March 2008.

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Where Y_i is the school-level percentage of "hard stayers", β_0 is the constant, β_{1-4} are the blocks of independent variables and ε_i is the error term.

The same blocks of student, school, teacher and teaching conditions variables employed in the student learning models were utilized for the estimated retention models (CPI was used as a school variable in lieu of the hard stayer variable. See Appendix C for variable definitions).

For each model all independent variables were originally entered. Non-significant variables were deleted until the model with the highest variance explained (adjusted R-squared) was found. Therefore, not all independent variables listed above are included in the final models presented.

Independent variables were entered together, without the use of stepwise or other entry methods. Results were then standardized and converted to a 0 to 100 scale to aid in interpretation of results.

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Statistical Model Explaining Elementary School Teacher Attrition

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Std. Error	Beta		
(Constant)	30.685	5.079		6.042	.000
Free- and Reduced-Price Lunch Eligible	-.039	.018	-.063	-2.134	.033
Minority Student	.067	.008	.273	8.593	.000
Teachers Fully Licensed in Assignment Area	-.158	.048	-.091	-3.267	.001
Teachers with Advanced Degrees	-.045	.019	-.061	-2.300	.022
Average Daily Membership	-.004	.001	-.129	-4.782	.000
Leadership Factor	-1.578	.511	-.109	-3.088	.002
Professional Development Factor	1.229	.621	.067	1.980	.048

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.379	.143	.139	6.39903	.007

Statistical Model Explaining Middle School Teacher Attrition

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-206.744	187.116		-1.105	.270
Free- and Reduced-Price Lunch Eligible	-.024	.030	-.066	-.793	.428
Limited English Proficient	-.019	.058	-.017	-.330	.741
Minority Student	.076	.020	.277	3.845	.000
Teachers Fully Licensed in Assignment Area	-.136	.050	-.149	-2.715	.007
Average Daily Membership	-.004	.002	-.138	-2.300	.022
Average Book Copyright	.123	.094	.062	1.309	.191
Decision Making Factor	-3.180	1.202	-.130	-2.646	.008

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.409	.167	.153	6.66106	.014

Statistical Model Explaining Secondary School Teacher Attrition

Model	Unstandardized Coefficients		Standardized Coefficients	t	Statistical Significance
	B	Std. Error	Beta		
(Constant)	197.576	106.229		1.860	.064
Free- and Reduced-Price Lunch Eligible	-.049	.029	-.142	-1.693	.091
Minority Student	.061	.026	.252	2.371	.018
Teachers Fully Licensed in Assignment Area	-.231	.053	-.267	-4.363	.000
Minority Educator	.033	.034	.098	.987	.324
Average Daily Membership	-.002	.001	-.200	-3.102	.002
Student-Teacher Ratio	.485	.167	.180	2.905	.004
Classrooms with Internet Connectivity	3.136	1.956	.075	1.604	.110
Student-Book Ratio	.134	.035	.183	3.790	.000
Average Book Copyright	-.081	.053	-.075	-1.521	.129
Facilities and Resources Factor	-2.737	.865	-.159	-3.163	.002

R	R Square	Adjusted R Square	Standard. Error of the Estimate	R Square Change
.557	.310	.289	5.24249	.021