The Prediction of Performance on the Maryland High School Graduation Exam: Magnitude, Modeling and Reliability of Results[1]

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Introduction

As more and more states join the national testing movement, high school exit exams are now determining whether more than half the nation's public school students will graduate (McColskey & McMunn, 2000; Berman & Christopher & Evans, 2000). The State of Maryland has determined that passing a series of end-of-course High School Assessments (HSA) will be a graduation requirement for students who enter grade 9 in the fall of 2005 or after. The required HSA examinations measure individual student progress toward Maryland's High School Core Learning Goals, and include tests in English, algebra/data analysis, biology, and government. Students take each test as they complete the relevant course. Since 2002, all students taking the courses associated with these assessments have been required to take the tests. However, students entering grade 9 in the fall of 2005 are required to pass each test or achieve a composite score established by the State. The requirement extends to students who enrolled in an HSA assessed course and took the requisite exam during their 7^{th} or 8^{th} grade years – prior to their entering 9^{th} grade.

School systems throughout the state are now preparing their students to pass these exams in order to receive a high school diploma. Since the pass rates for students tested over the past several years have hovered around 60% statewide, the need to examine factors associated with performance has become urgent. It has been suggested that state education officials must do more to help students who are likely to fail those exams (Bushweller, 2004). It is especially important to discover possible predictors of performance as early as possible in students' academic careers so that intervention strategies may be employed much earlier in their educational careers (Nichols, 2003).

To accomplish this purpose, the Maryland Assessment Research Center for Education Success (MARCES) has been asked by the Maryland State Department of Education (MSDE) to organize this study of indicators of potential risk for students before they take the HSA examination. A planning committee including representatives from four school systems in Maryland was constituted to provide direction and data to support the study. The committee agreed to begin with data currently available on HSA tests related to No Child Left Behind in a related subject area that exists in earlier grades and that show some potential to be influenced by interventions (with the exception of gender which was used by system 4). The HSA in English 1, administered to 9th grade English students, is the only test that currently meets this criterion.

The key research questions for this project are:

1) To what extent is performance on the HSA predicted by prior performance on the related Maryland School Assessment (MSA) and/or other preceding examinations or available indicators of academic success?

2) Which predictive variables are based upon school and/or the teacher level information and are these variables consistent across the four school systems?

3) Are the statistical models based on OLS and HLM that best fit these data consistent across the four school systems?

4) Is the magnitude of predictability the same across the four school systems?

5) What are the predictive characteristics of students, teachers and schools that appear to be amenable to intervention?

6) What is the relative importance of predictors at the teacher/school level compared to the student level for predicting HSA performance?

Method

The project was based on school, teacher and student data collected for the 2002-2003 and the 2003-2004 school years for students throughout four school systems of Maryland. The student-level variables are very similar across the four school systems because of the mandates for reporting to the state, although differences at the teacher/school level exist. The dependent variable (the criterion) for the study, in each system, is the English 1 HSA scale score for students who took the exam as 9th graders in the Spring of 2004.

An ordinary least squares (OLS) multiple regression for identification of factors that put students at risk for failure was first conducted for each school system. Then, if justified by the intra-class correlation (ICC), a two-level HLM (Bryk et al., 1996) was performed to partition variance into components for different levels of the hierarchy (students nested within teachers/schools).

Each of the following systems was able to provide variables at both the student level and the school level:

School System One. Approximately 26,000 students are enrolled in 32 schools in the school system. Student body consists of White (50%), African American (43%) American Indian/Alaskan Native (1 %), Asian (3 %) and Hispanic (3 %).. Approximately 16.7% of the students receive reduced-price meals and 3.4% of the students attend the special education program. The data for this study (n=1244) consist of eight predictors

School System Two. More than 40,000 students are enrolled in 51 schools in the system. The school system has the seventh largest student enrollment of the 24 public school systems in the state. Approximately 2% of the students are second language speakers, 15% of the students receive reduced-price meals and 13.4% of the students attend the special education program. The data (n=2663) from this school system consist of eight predictors.

School System Three. The school system consistently ranks as the state's top school districts based on student performance on the state School Assessments. Student body consists of White (61%), African American (20%), Asian (13%) and Hispanic (4%). Students score above the national averages on standardized tests and over 85% of graduates continue their education beyond high school. Approximately 1.2% of the

students are second language speakers, 5.7% of the students receive reduced-price meals and 7.2% of the students attend the special education program. The data (n=3617) from this school system consists of twelve predictors.

School System Four. This school system is the 2nd largest school system in the state and the eighteenth largest in the nation, serving more than 134,000 students in 202 schools. Student body consists of Native American (0.52%), Asian (2.85%), African American (74.35%), Caucasian (6.14%), and Hispanic (13.60%).. Approximately 6.11% of the students are second language speakers, 43% of the students receive reduced-price meals and 9.7% of the students attend the special education program. The data (n=9625) from this school system consist of seventeen predictors

System One

Measures: The student-level predictors for the OLS regression included an MSA reading score for 2003 (MSA_READ_SCORE_03), an MSA mathematics score for 2003 (MSA_MATH_SCORE_03), eligibility status for Free and Reduced-price Meals (FARMS03), participation in special education (SPED03), Grade Point Average score in 2002-2003 (GPA 2002-2003), and present at the first day of school or not (PRE1DAY) – an indicator of full-year enrollment. Two teacher-level predictors were also included in the regression: highest degree (Tdegree) and years of experience (Tyears). Every continuous indicator including MSA reading score at 2003, MSA mathematics score at 2003 and GPA score in 2002-2003 are standardized to make interpretation of the results easier.

System Two

Measures: The student-level predictors for the OLS regression included MSA reading score at 2003 (MSA_READ_SCORE_03), special education participation (SPED03), Grade Point Average score in 2002-2003 (GPA 2002-2003), score on the county's mid-term examination (MidTerm_04), previous performance on the Scholastic Reading Inventory, which provides a reading lexile score (SRI_03_SS), and students' percentage of days attending school (Attend). In addition, two teacher-level predictors were included in the regression: teachers' degree (Tdegree) and

teachers' years of experience (Tyears). All the continuous indicators, including MSA reading score at 2003, GPA score in 2002-2003, Students' midterm score at 2004, Scholastic Reading Inventory Lexile Spring 2003, and students' percentage of days attending school, were standardized to make interpretation of the results easier. .

System Three

Measures: The student-level predictors for the OLS regression included MSA reading score at 2003 (MSA_READ_SCORE_03), MSA mathematics score at 2003 (MSA_MATH_SCORE_03), days present in school (Present), Free and Reduced-price Meals (FARMS03), special education programs (SPED03), and English language learner (ELL03). In addition, the following six school-level predictors were included in the regression: percentage of students in special education at the high school (HSSPED), high school percentage of ELL students (HSELL), high school percentage of FARMS-eligible students (HSFARMS), average daily attendance rate (HSATTEND), percentage of highly qualified teachers (HSHQT), and aggregated school attendance rate for 2004 (Sch_att). Every student-level continuous indicator, including MSA reading score at 2003, MSA mathematics scores at 2003, and days present in school, was standardized.

System Four

Measures: The eight student-level predictors for the OLS regression included MSA reading score at 2003 (MSA_READ_SCORE_03), MSA mathematics score at 2003 (MSA_MATH_SCORE_03), percentage of days attending school (Attend), middle school GPA (GPA03), Free and Reduced-price Meals (FARMS03) – an indicator of the number of students of poverty, special education students (SPED03), and English Language Learners (ELL03).

In addition, six school-level predictors were included in the regression: high school's percentage of students taking SPED (HSSPED), high school's percentage of ELL students (HSELL), high school's percentage of students taking FARMS (HSFARMS), high school's percentage of students attendance (HSATTEND), high school's percentage of highly qualified teachers (HSHQT), and number of 9th grade students suspended (Suspended).

All the student-level continuous indicators including MSA reading score at 2003, MSA mathematics scores at 2003, percentage of days attending school and middle school GPA were standardized.

Across the four school systems, the HSA English score significantly correlates with all the student-level variables positively except FARMS03, SPED03 and ELL03. ELL03 seems to have the lowest correlations with the rest of the student-level variables (See tables 1, 2, 3 and 4). The variable ATTEND is moderately skewed and has high kurtosis, since most of the students attend school regularly. The characteristics of these data, obviously, have an impact upon the multiple regression results and upon the multi-level modeling results. The sample size for number of students is sufficient to detect rather small effects. The sample size for the number of schools was not nearly as large as we had hoped and introduces difficulties for modeling school level effects. For a variety of reasons we made the decision not to combine these four data sets into a single analysis. The primary reason being that the school/teacher level variables were not consistent across the 4 systems and examining effects at that level that was our primary motivation for considering combining the data.

Results

System One

OLS analysis: The OLS regression model explains 62.9% of the variance in the standardized dependent variable – HSA English 1 score. The model is significant (F=223.684 and p-value=.000), and all predictors except for teacher years of experience were significant.

Results show that students with high GPA, high MSA reading score and high MSA mathematics score tend to be associated with high HSA English scores with positive slopes. Among the three predictors, MSA reading score has the largest regression unstandardized coefficient of 0.554, while GPA has the lowest unstandardized regression coefficient of .0663 (see Table 5). FARMS-eligible and special education students were found to have significantly lower HSA English scores with negative slopes. Also, there is a positive relationship between a teacher's degree level and his or her students' HSA scores. However, the results also indicate that full-year enrolled students tend to get significantly lower HSA English scores.

HLM analysis: The software of HLM 6 was run for multilevel analysis. First, a one-Way Random Effects Analysis of Variance (Fully Unconditional Model) was run. At the student level, the basic equation is:

$$HSA_{ij} = \beta_{oj} + r_{ij}$$

where β_{oj} is the mean score of the standardized English achievement of HSA for teacher j. r_{ij} is the deviation from this mean for Student i for Teacher j . HSA_{ij} is the dependent variable, standardized English achievement of HSA of Student i for Teacher j.

At the teacher level, β_{oj} is allowed to vary randomly across teachers,

$$\beta_{oj} = \gamma_{oo} + u_{oj}$$

In the Equation, γ_{oo} is the overall, across-teacher mean of HSA scores; u_{oj} is the error term capturing teacher-level deviation in mean achievement from γ_{oo}. Both r_{ij} and u_{oj} are error terms and represent the partitioning of variance between and within schools. The variance of u_{oj}= var(u_{oj})= τ_{00} and the variance of r_{ij}= var(r_{ij}) = σ^2. We estimated that τ_{00} is 0.15635 and σ^2 is 0.88756. The intra-class correlation is calculated to be $\rho = \tau_{00} / (\tau_{00} + \sigma^2) = 0.15635 /(0.15635 + 0.88756) = .14977$ and indicates the proportion of variance between nesting units (or proportion of variance in the Level 1 dependent variable that is found across Level 2 grouping units). Results of this fully unconditional model show that HSA English score does appear to demonstrate some variability at the teacher level.

Then the model with student- and teacher-level variables was run. This model was based on the previous six significant predictors from the regression analysis as well as the two teacher-level variables. At the student-level, the basic equation is

$$HSA_{ij} = \beta_{oj} + \beta_{1j} *(FARM03) + \beta_{2j} *(SPED03) + \beta_{3j} *(ZGPA0203) + \beta_{4j} *(ZMSAMS) + \beta_{5j} *(ZMSARS) + \beta_{6j} *(ZPRE1DAY) + r_{ij}$$

where HSA English score is expressed as a function of FARM, β_{1j} ; student SPED, β_{2j}; student's standardized GPA, β_{3j}; students' MSA mathematics score at 2003, β_{4j} ; MSA reading score at 2003, β_{4j} ; present at the first day of school or not, β_{6j} ; and conditional error that remains after controlling for Tyears and Tdegree, r_{ij}.

The variance of the standardized HSA English score can be modeled with the two teacher-level predictors: teachers' degree (Tdegree) and teachers' years of experience (Tyears). Incorporating those variables in the equation results in the following changes to the school-level equations:

$$\beta_{oj} = \gamma_{oo} + \gamma_{o1} *(TDEGREE) + \gamma_{o2} *(TYEARS) + u_{oj}$$

where γ_{oo} is the grand mean for HSA English reading score (overall intercept); γ_{o1} is the relationship between TDEGREE and HSA English score; γ_{o2} is the relationship between TYEARS and HSA English score.

Results are presented in Table 6 under System one. Three student-level variables—GPA, MSA reading, and MSA mathematics--are related positively to HSA English scores. By contrast, FARMS-eligible and special education students tend to obtain lower HSA English scores. One of the two teacher variables--teacher degree—was positively associated with HSA scores (the higher the teacher's degree, the higher HSA scores students tend to get) whereas years of teaching experience is not significant. In addition, the results also indicate that the variable that captures whether students were present at the first day of school has no significant effect on HSA English scores.

System Two:

OLS analysis: The OLS regression model explains 70% of the variance in the standardized HSA English scores. An F test indicates that the model is significant (F= 587.5726, p-value=.000). All predictors are significant except the teacher-level variables – teacher's degree and teacher's years of experience.

Results show that students with high GPA, high MSA reading score, high midterm score, high Scholastic Reading Inventory (SRI) scores one year before the test and percentage of days attending school tend to achieve high HSA English scores with positive slopes. Among the five predictors, SRI lexile at Spring 2003 has the largest regression unstandardized coefficient (0.3352), followed by mid-term test score (0.28432), and MSA reading score (0.19671; see Table 5). GPA and attendance percentage have the smallest unstandardized regression coefficients (0.078584 and 0.0410595, respectively). HSA English scores are negatively

associated with special education status (unstandardized regression coefficient= -0.116). However, it's disappointing to find that neither of the two teacher-level variables is significant.

HLM analysis: The intra-class correlation was calculated to be $\rho = \tau_{00} / (\tau_{00} + \sigma^2) = 0.40435 /(0.40435 + 0.69527) = .367718$ and indicates that 36.7718% of variance that is between nesting The results of this fully unconditional model show that HSA English score does appear to demonstrate variability at the teacher level. Then the model with student- and teacher-level variables was run. This model was based on the previous six significant predictors from the regression analysis as well as the two teacher-level variables.

Results are shown in Table 6 under System Two. Results similar to the OLS regression analysis show that students with high GPA, high MSA reading score, high midterm score, and high SRI scores tend to achieve high HSA English scores with positive slopes. Among the five predictors, SRI lexile at Spring 2003 has the largest coefficient of 0.333878, followed by the predictor of midterm score with coefficient of 0.285930 and the predictor of MSA reading score with unstandardized coefficient of 0.157925. GPA and attendance percentage have a small regression coefficient of 0.089129. Special education students tend to have significantly lower HSA English scores with negative coefficient of -0.146862. Again, it's disappointing to find that neither of the two teacher-level variables is significant. However, the attendance percentage turns out to be non-significant in the HLM analysis.

System Three

OLS analysis: The OLS regression model explains 56% of the variance in the standardized HSA English scores. The F test indicates that the model is significant

with F= 587.5726 and p-value=.000. Again, all predictors are significant except for teacher-level variables – teacher's degree and teacher's years of experience.

Results show that students with high MSA mathematics score, high MSA reading score or high percent attendance tend to achieve high HSA English scores with positive slopes. Among the three predictors, the predictor of MSA reading score has the largest regression unstandardized coefficient of .463, followed by the predictor of the MSA mathematics score with unstandardized coefficient of .199 and the predictor of days present at school with unstandardized coefficient of 0.105 (see Table 5). Special education students, English Language Learners, and FARMS-eligible students tend to have significant lower HSA English scores with negative unstandardized regression coefficient of -.409, -.354 and -.228 respectively. In addition, the higher the percent of ELL students in the school, the lower the average HSA score students in the school tend to get. However, it's disappointing to find that the rest of the school-level variables are all non-significant.

HLM analysis: the intra-class correlation was calculated as $\rho = \tau_{00} / (\tau_{00} + \sigma^2)$ = 0.04407 /(0.04407 + 0.85034) = 0.049273, indicating that 4.9273% of variance is between nesting units. This model did not find variability in HSA English scores at the school level and thus the two-level model was not run.

System Four

OLS analysis: The OLS regression model explains 58.4% of the variance in the standardized HSA English scores. An F test indicates that the model is significant (F= 815.809 and p-value=.000) and that all predictors including student-level and five of the school-level variables are significant.

Results show that students with high MSA mathematics score, high MSA reading score, high middle school GPA, or high percentage of days attending school

tend to achieve high HSA English scores with positive slopes. Among the five predictors, the predictor of MSA reading score has the largest regression unstandardized coefficient of .317, followed by the predictor of GPA with the unstandardized coefficient of 0.220 and the predictor of the MSA mathematics score with unstandardized coefficient of .170. The effect of student attendance is minimal with an unstandardized coefficient of .0454 (see Table 5). Special education students, English Language Learners, and FARMS-eligible students tend to have significantly lower HSA English scores, with negative unstandardized regression coefficient of -.431, -.247 and -.0722 respectively. In addition, the higher the percent of ELL students in the school, the lower HSA score students tend to get. Results also indicate that females tend to get higher HSA scores than males.

Results were in line with expectations. Schools with more highly qualified teachers tend to get higher HSA average scores. By contrast, schools serving more ELL students tend to get lower HSA average scores. Results also indicate that schools with higher percent of special education and FARMS-eligible students tend to get slightly higher HSA average scores.

HLM analysis: The intra-class correlation was calculated to be $\rho = \tau_{00} / (\tau_{00} + \sigma^2) = 0.09114 /(0.09114 + 0.78235) = 0.10434$, indicating that 10.434% of variance is between schools. In sum, the results of this fully unconditional model show that HSA English score does appear to demonstrate some variability at the school level.

A model with student- and school-level variables was run. This model was based on the previous ten significant student-level predictors from the regression analysis as well as the seven school-level variables. At the student-level, the basic equation is

$$HSA_{ij} = \beta_{oj} + \beta_{1j} *(FARM03) + \beta_{2j} *(SPED03) + \beta_{3j} *(ELL03) + \beta_{4j} *(ZMSAMS) + \beta_{5j} *(ZMSARS) + \beta_{6j} *(ZGPA0203) + \beta_{7j} *(SEX) + \beta_{8j} *(ATTEND) + + r_{ij}$$

where HSA English score is expressed as a function of FARM03, β_{1j} ; student SPED, β_{2j}; students' ELL03, β_{3j} ; MSA mathematics score at 2003, β_{4j} ; MSA reading score at 2003, β_{5j} ; student's standardized GPA, β_{6j}; students' sex, β_{7j} ;students' attendance percentage, β_{8j} ;and conditional error that remains after controlling for the school-level variables, r_{ij}.

The variance on the average score of the standardized English achievement of HSA may be modeled with the six school-level predictors -- high school's percentage special education (HSSPED), high school's percentage of ELL students (HSELL), high school's percentage of students of poverty (HSFARMS), high school's percentage of students attendance (HSATTEND), high school's percentage of highly qualified teachers (HSHQT), and number of 9th grade students suspended (Suspended). Incorporating those variables led to the following changes to the school-level equations:

$$\beta_{oj} = \gamma_{oo} + \gamma_{o1} *(HSSPED) + \gamma_{o2} *(HSELL) + \gamma_{o3} *(HSFARMS) + \gamma_{o4} *(HSATTEND) + \gamma_{o5} *(HSHQT) + \gamma_{o6} *(Suspended) + u_{oj}$$

where γ_{oo} is the grand mean for HSA English reading score (overall intercept); γ_{o1} is the relationship between high school's percentage of students taking SPED and HSA English score; γ_{o2} is the relationship between high school's percentage of ELL students and HSA English score; γ_{o3} is the relationship between high school's percentage of students taking FARMS and HSA English score; γ_{o4} is the relationship between high school's percentage of students attendance and HSA English score; γ_{o5}

is the relationship between high school's percentage of highly qualified teachers and HSA English score; γ_{06} is the relationship between number of 9th grade students suspended and HSA English score.

Results are presented in Table 6 under System Four. Results are similar to the OLS regression analysis results with a few exceptions. First, the percentage of days attending school was not significant at the student –level. Second, only three out of the seven level-2 variables are significant: HSELL, HSFARMS and HSATTEND. That is, schools with higher percent of ELL students tend to get lower HSA average HSA scores. On the contrary, schools with higher percent of FARMS-eligible students tend to get higher HSA average scores. In addition, schools of higher percentage of attendance tend to get higher average HSA score.

Summary and Discussion

In this section of the paper we return to the original questions that we posed and present our findings organized around each of them.

1) *To what extent is performance on the HSA predicted by prior performance on the related Maryland School Assessment (MSA) and/or other preceding examinations or available indicators of academic success?*

Several important predictors of HSA performance emerged from the study. These include two measures of reading (performance on MSA Reading and the Scholastic Reading Inventory, although that test is available in only one county), poverty (defined as FARMS-eligibility), special education, and ELL status. There was some evidence that a student's attendance, English scores at midterm, and GPA also seem to be related to his or her performance on the HSA English 1 exam.

Performance on the MSA test in grade 8 can be used as a tool for identifying students who are at risk of failing. This assessment provides information that was highly correlated with performance on the HSA examination and serves as an important early indicator. Performance on related course examinations (the midterm test) and overall academic performance (GPA) are also promising predictors. Particular attention should be paid to special education students, English Language Learners, and students of poverty. It may be of interest to disentangle the reported discrepancy between males and females in future studies.

2) *Which predictive variables are based upon school and/or the teacher level information and are these variables consistent across the four school systems?*

From the results of system one, one of the two teacher variables--teacher degree—was positively associated with HSA scores, indicating that the teacher with higher degrees tend to be associated with the higher HSA scoring students. From the results of system four, HSELL, HSFARMS and HSATTEND all seem to have significant associations with HSA, although the effects of HSFARMS and HSATTEND seem to be very small with coefficients less than .1. However, schools with higher percent of ELL students tend to get lower average HSA scores.

3) *Are the statistical models based on OLS and HLM that best fit these data consistent across the four school systems?*

Consistent Results across the Systems. Across the four analyses, the following are consistent results:

1. Students with higher scale scores on the MSA Reading in 2003 tend to get higher HSA English scores.

2. Students with higher scale scores on the MSA mathematics in 2003 tend to get higher HSA English scores. Results are supported by data from systems one, three and four.
3. FARMS-eligible students tend to have lower HSA English scores. Results are supported by data from systems one, three and four.
4. Special education students tend to have lower HSA English scores.
5. Students with higher GPA tend to have higher HSA English scores. Results are supported by data from systems one, three and four.
6. Students who attend school more regularly tend to get higher HSA score, indicated by the OLS analysis result. However, the predictor becomes insignificant at the HLM level. Results are supported by data from systems two and four.
7. Students who are English Language Learners tend to get lower HSA score. Results are supported by data from systems three and four.
8. Schools serving more English Language Learners tend to have lower HSA scores. Results are supported by data from systems three and four.

Results from Individual Systems. The following are some results supported by individual systems:

System two:

1. Results indicate that the better the English midterm grade, the higher the HSA English scores of the students.
2. Results indicate that higher SRI scores are associated with higher HSA English scores.

System three:

3. Results show that full-academic-year students tend to get higher HSA English scores.

System four:

4. Results show a gender-based difference on average HSA scores.

Inconsistent Results across the Systems:

1. System one's results indicate that higher teacher's degree is associated with higher average HSA scores. However, system two's results show that the variable of the teacher's degree is not significant.
2. In system four's results, all seven school-level variables are significant in the OLS analysis. However, only three turn out to be significant in HLM analysis -- HSELL, HSFARMS and HSATTEND. That is, schools with higher percent of ELL students tend to get lower HSA average scores. On the contrary, schools with higher percent of students of poverty tend to get higher HSA average scores, as do schools with higher percent attendance.

4) *Is the magnitude of predictability the same across the four school systems?*

The magnitude is reasonably high in each of the four systems. The OLS regression model explains 62.9%, 70%, 56%, and 58.4% of the variance in the standardized dependent variable – HSA English score for school system one, two, three and four respectively.

5) *What are the predictive characteristics of students, teachers and schools that appear to be amenable to intervention?*

This question needs much greater attention in our subsequent studies of this matter. We already noted that a number of predictors (see question 1) are very helpful in identifying students' performance (serving as leading indicators), such as the MSA reading and mathematics test in grade 8, students' performance on related course

examinations (the midterm test) as well as overall academic performance (GPA). What we need to do next is determine if improving MSA performance, for example, can be achieved by intervention and then if it can will that lead to higher performance on the HSA.

6) *What is the relative importance of predictors at the teacher/school level compared to the student level for predicting HSA performance?*

The English HSA score with the unconditional model has 14.977% of variance at the teacher level in school system one. There is 36.7718% of variance at the teacher level in school system two for the unconditional model. For school system three, there is 4.9273% of variance at the school level for the unconditional model, which is not much for the variability in HSA English scores. However, there is 10.434% of variance between schools for school system four for the unconditional model.

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Table 1: Correlations for student-level variables at System One.

	HSA04ENG	MSA_READ _03	MSA _MATH_03	FARM03	SPED03	GPA0203	ATTEND
HSA04ENG	1.000	.759	.671	-.294	-.247	.202	.190
MSA_READ _03	.759	1.000	.706	-.281	-.204	.352	.193
MSA _MATH_03	.671	.706	1.000	-.281	-.270	.391	.217
FARM03	-.294	-.281	-.281	1.000	.121	-.143	-.087
SPED03	-.247	-.204	-.270	.121	1.000	-.075	-.013[a]
GPA0203	.202	.352	.391	-.143	-.075	1.000	.223
ATTEND	.190	.193	.217	-.087	-.013	.223	1.000

Note: Superscript *a* indicates that the correlation is not significant at the 0.05 level (2-tailed). Correlations without a superscript are all significant at .05 level.

Table 2: Correlations for student-level variables at System Two.

	HSA04ENG	MSA_READ _03	SPED03	GPA_02	MidTerm_04	SRI_03_SS	ATTEND
HSA04ENG	1.000	.710	-.403	.425	.751	.782	.329
MSA_READ _03	.710	1.000	-.374	.352	.670	.736	.272
SPED03	-.403	-.374	1.000	-.239	-.352	-.377	-.114
GPA_02	.425	.352	-.239	1.000	.371	.368	.291
MidTerm_04	.751	.670	-.352	.371	1.000	.726	.210
SRI_03_SS	.782	.736	-.377	.368	.726	1.000	.227
ATTEND	.329	.272	-.114	.291	.210	.227	1.000

Note: Correlations are all significant at .05 level.

Table 3: Correlations for student-level variables at System Three.

	HSA04ENG	MSA_READ _03	MSA _MATH_03	PRESENT	FARMS03	SPED03	ELL03
HSA04ENG	1.000	.704	.581	.261	-.200	-.293	-.101
MSA_READ _03	.704	1.000	.590	.184	-.216	-.309	-.160
MSA _MATH_03	.581	.590	1.000	.318	-.213	-.308	.001 [a]
PRESENT	.261	.184	.318	1.000	-.044	-.038 [a]	.038 [a]
FARMS03	-.200	-.216	-.213	-.044	1.000	.085	.047
SPED03	-.293	-.309	-.308	-.038 [a]	.085	1.000	-.031 [a]
ELL03	-.101	-.160	.001 [a]	.038 [a]	.047	-.031 [a]	1.000

Note: Superscript *a* indicates that the correlation is not significant at the 0.05 level (2-tailed). Correlations without a superscript are all significant at .05 level.

Table 4: Correlations for student-level variables at System Four.

	HSA04ENG	MSA_READ _03	MSA _MATH_03	Attend	GPA03	Sex	FARMS03	SPED03	ELL03
HSA04ENG	1.000	.670	.630	.322	.558	.249	-.171	-.379	-.007 [a]
MSA_READ _03	.670	1.000	.678	.255	.484	.151	-.185	-.313	-.015 [a]
MSA _MATH_03	.630	.678	1.000	.261	.509	.100	-.178	-.377	.000 [a]
Attend	.322	.255	.261	1.000	.424	.011 [a]	-.135	-.126	.019 [a]
GPA03	.558	.484	.509	.424	1.000	.262	-.142	-.117	.044
Sex	.249	.151	.100	.011	.262	1.000	.013 [a]	-.125	.030
FARMS03	-.171	-.185	-.178	-.135	-.142	.013 [a]	1.000	.109	.054
SPED03	-.379	-.313	-.377	-.126	-.117	-.125	.109	1.000	-.024 [a]
ELL03	-.007 [a]	-.015 [a]	.000 [a]	.019 [a]	.044	.030	.054	-.024 [a]	1.000

Note: Superscript *a* indicates that the correlation is not significant at the 0.05 level (2-tailed). Correlations without a superscript are all significant at .05 level.

Table 5: OLS Regression Analysis Results.

Indicators	System One		System Two		System Three		System Four	
	Unstandardized Coefficient	p-value	Unstandardized Coefficient	p-value	Unstandardized Coefficient	p-value	Unstandardized Coefficient	p-value
Constant	0.171	0.22	0.0408	0.11	-7.358	0.03	-6.978	0.000
Student-level variables								
MSA_READ _03	0.554	0.000	0.197	0.000	0.463	0.000	.317	0.000
MSA _MATH_03	0.228	0.000	--	--	0.199	0.000	.170	0.000
FARMS03	-0.141	0.01	--	--	-0.228	0.000	-0.07225	0.000
SPED03	-0.311	0.01	-0.116	0	-0.409	0.000	-.431	0.000
GPA 2002-2003	0.0663	0.02	0.0786	0.000	--	--	.220	0.000
PRE1DAY	-0.41	0	--	--	--	--	--	--
SRI_03_SS	--	--	0.335	0.000	--	--	--	--
Midterm_04	--	--	0.284	0.000	--	--	--	--
Attend	--	--	0.0411	0	--	--	0.0454	0.000
ELL03	--	--	--	--	-0.354	0.000	-.247	0.001
Present	--	--	--	--	0.105	0.000	--	--
Sex	--	--	--	--	--	--	0.168	0.000
Teacher-level variables								
Tdegree	0.0711	0	0.0105	0.34	--	--	--	--
Tyears	-0.002	0.41	0.0004	0.73	--	--	--	--
School-level variables								
HSSPED	--	--	--	--	0.0159	0.22	0.0105	0.000
HSELL	--	--	--	--	-0.023	0.000	-.275	0.000
HSFARMS	--	--	--	--	0.004	0.28	0.008923	0.000
HSATTEND	--	--	--	--	0.0132	0.75	0.06849	0.000
HSHQT	--	--	--	--	0.0009	0.34	0.001923	0.011
SCH_ATT	--	--	--	--	0.0623	0.27	--	--
Suspended	--	--	--	--	--	--	0.00007763	0.611

Table 6: HLM Analysis Results.

	System One		System Two		System Four	
Indicators	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Student-level variables						
MSA_READ_03	0.5473	0.000	0.1579	0.000	0.316453	0.000
MSA_MATH_03	0.2256	0.000	--	--	0.165538	0.000
FARMS03	-0.136	0.02	--	--	-0.073442	0.002
SPED03	-0.282	0.03	-0.147	0.000	-0.442576	0.000
GPA 2002-2003	0.0662	0.03	0.0891	0.004	0.215216	0.000
PRE1DAY	-0.143	0.09	--	--	--	--
SRI_03_SS	--	--	0.3339	0.000	--	--
Midterm_04	--	--	0.2859	0.000	--	--
Attend	--	--	0.0362	0.09	0.049805	0.091
ELL03	--	--	--	--	-0.235196	0.004
Present	--	--	--	--		
Sex	--	--	--	--	0.172955	0.000
Teacher-level variables						
Tdegree	0.0741	0.03	-0.024	0.33	--	--
Tyears	-0.001	0.64	-9E-04	0.79	--	--
School-level variables						
HSSPED	--	--	--	--	0.009388	0.188
HSELL	--	--	--	--	-0.279788	0.000
HSFARMS	--	--	--	--	0.008419	0.002
HSATTEND	--	--	--	--	0.063903	0.002
HSHQT	--	--	--	--	0.001372	0.542
Suspended	--	--	--	--	0.000305	.536

Note: System three is omitted from this table due to insufficient level-2 variability.