STRATEGIC DATA PROJECT

Student Success & College Readiness: Translating Predictive Analytics Into Action

Shane Hall, Dallas Independent School District
Ben Levinger, Anthony Sims, and Anthony Whittington, Prince George's County Public Schools
Jason Becker, Providence Public Schools

Problem Statement

Preparing students for college is a priority for school systems nationwide. Yet, little consensus exists on the best supports and interventions to ensure such an outcome. *How can predictive analytics support school systems to measure and support on-time high school graduation and college readiness?*

Literature Review

Research by Conley (2007), CCSR (2005, 2007, 2009, 2012), and others has identified indicators that include 9th grade GPA and motivational/behavioral indicators associated with on-time graduation and college readiness. The work of the agencies presented here applies modern analytics and "big data" to key issues facing K-12 education systems.

Fellows

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Case Studies

Dallas Independent School District, TX

About Us: 223 schools; 158,000 students; 69.5% Hispanic, 23.8% African-American, 4.6% White, and 2.1% Other

Research Questions:
- How well does the Dallas ISD **College Readiness Indicator Systems (CRIS)** model predict student success (e.g., on-time graduation and college enrollment)?
- What activities and interventions best support college readiness in Dallas?
- What are the most significant elementary and middle school indicators for success?

Project Scope: Validation of the CRIS model is ongoing; we expect to add elementary/middle school indicators by end of 2014.

Prince George's County Public Schools, MD

About Us: 205 schools; 128,437 students; 65.3% African-American, 26.1% Hispanic, 4.6% White, 3.2% Asian, and 0.9% Other

Research Questions:
- Can we predict which students are more likely to be retained in 9th grade based on past performance?
- How can we best use this **Early Warning Indicator System** to help our students succeed?
- What interventions have been most successful (or least successful) in improving the performance of our 9th graders and middle school students? Do we see an impact of this version of the EWI system in its first year?

Project Scope: The improved EWI system is in its first year and reports are being sent out each quarter to grades 7-9. Evidence of its impact is currently being collected. We are motivated to improve the system for next year; some ideas include: suggesting student-specific interventions, expanding the grade levels involved, and updating the model itself.

Providence Public School District, RI

About Us: 39 schools; 23,000 students; 64.7% Hispanic, 17.6% African-American, 8.6% White, 5% Asian, and 3% Multiracial

Research Questions:
- How can we use existing data to identify students who need additional supports before and during high school?
- How effective is data gather prior to high school entry at predicting high school success?
- What is the role of predictive data in a larger system of data-informed support and interventions?

Project Scope: New predictive analysis will be applied to students in the summer of 2014 and included in the **Personal Graduation Plan Reports** for the 2014-2015 school year.

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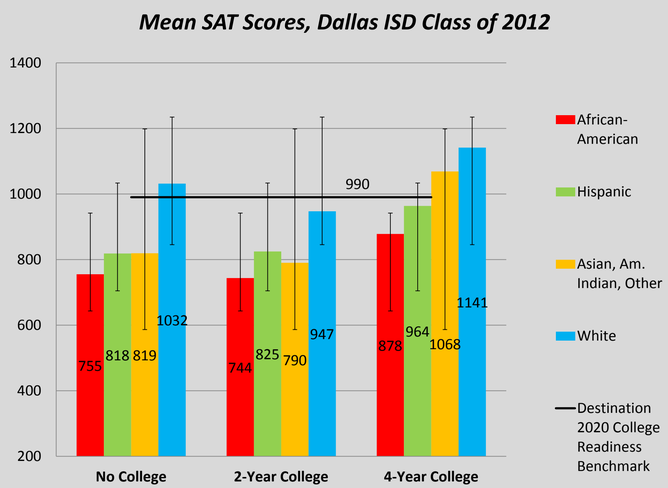
Results and Impact

Dallas ISD CRIS

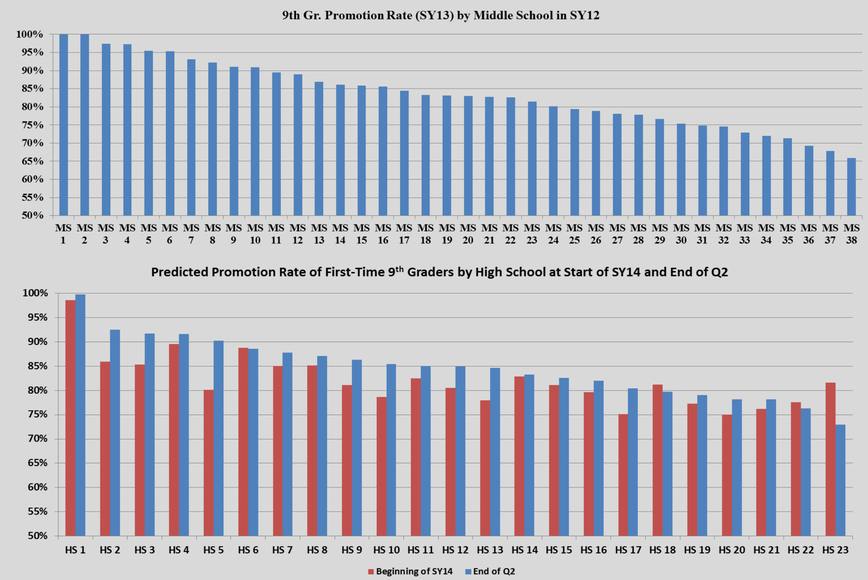


Dallas ISD's **Destination 2020** improvement plan calls for increasing the proportion of seniors who score at least a 21 composite on the ACT or a 990 (combined reading and math) on the SAT. The Dallas CRIS includes SAT and ACT scores. The majority of Dallas ISD graduates fall short of this benchmark.

Regression-based analyses by the Dallas ISD CRIS team found that the ACT/SAT scores of 2006 high school graduates who completed 4-year college degrees averaged 20.2 (ACT) and 1000 (SAT).

To expose students to college entrance exams earlier, Dallas ISD funded school-day SAT testing for the first time in February 2014 for all 11th grade students.

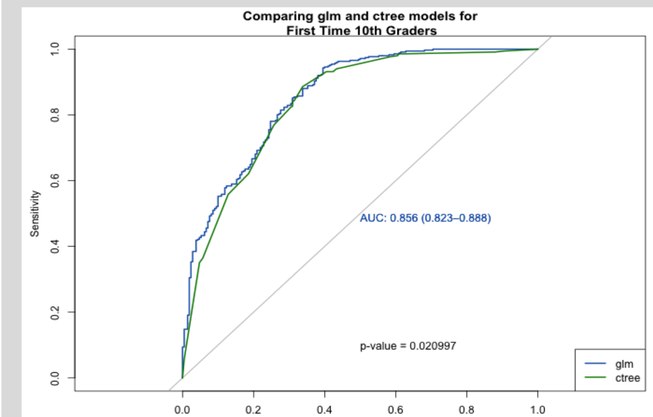
PGCPS' Early Warning System

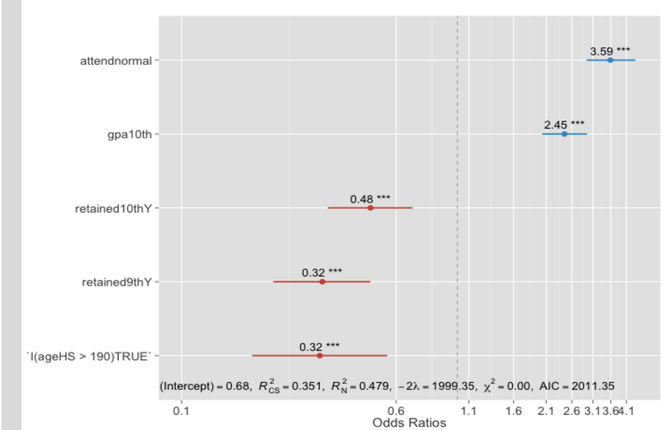


In 2012-13, only 78.5% of first-time 9th graders in PGCPS were promoted to 10th grade. The EWI model was built to predict the probability that a student will pass 9th grade. The top chart shows that 9th graders from different middle schools had wide variation in their likelihood of being promoted. Our EWI system includes 7th and 8th grade to help intervene earlier.

The model was rolled out at the beginning of 2013-14 and has been updated quarterly. The bottom chart shows the average promotion probability of first-time 9th graders by school at the beginning of the year and after Q2. This data shows the difference in 9th grade performance between schools, and shows how each school's performance has compared to their expected performance before the year began.

Providence Predictive Models





Predictive models in Providence Public Schools were generated by sampling training data and fitting several competing models to the data. Model parameters were estimated using 10-fold cross validation and the best models were compared by comparing the area under the curve of their receiver operating characteristics.

Consistently, logistic regressions outperformed competing techniques such as conditional inference trees. Model parameters for students finishing 10th grade for the first time are presented above.

Lessons Learned and Next Steps

- Predictive analytic techniques, such as regression models, outperformed older early warning system models in predicting student success in high school, college readiness, and postsecondary success.
- Indicators found to be predictive of college readiness and postsecondary success include high school GPA, SAT/ACT scores, and 9th grade on-track status. However, additional research is needed in the area of non-cognitive indicators, such as grit and academic tenacity. Developing and implementing valid measures of these indicators pose a major challenge.
- With targeted data, schools can focus their supports to increase academic success during 9th grade, which research has shown to be a critical "make or break" year.
- Support from executive-level leadership is critical to the success of Early Warning Indicator and College Readiness Indicator Systems.
- A next step is for all agencies to dig deeper into which interventions are successful for at-risk students with specific needs. Agencies will first document the types of interventions students received, then evaluate the effectiveness of these programs. Program evaluation is not easy, but a necessary piece of this work.