Unnamed Public Schools:
Early Warning Indicator System and 9th Grade Promotion

Agency Profile

Unnamed school district (USD) is a large, diverse school system, which borders a major city. There are about 125,000 students and 205 schools in PGCPS. Approximately 91% of the student population is African-American or Hispanic with 62% of students receiving Free and Reduced Meals (FARMS), compared to 44% of students statewide. USD began a partnership with the Strategic Data Project (SDP) in August 2012. Two unnamed people applied to SDP and were selected Agency Fellows. Unnamed 1 was a Performance Management Associate in the Division of Performance Management. He primarily worked to develop the data literacy of elementary and middle school leaders with a focus on enhancing their use of data to improve organizational effectiveness and student achievement. Unnamed 2 was the High School Performance Specialist. He provided direct assistance to the Associate Superintendent of Schools for those responsibilities that affect the implementation of high schools’ instructional programs. Unnamed 3 was an SDP Data Fellow selected by the Chief Academic Officer for the district. In August 2012, Unnamed 3 was appointed as a Strategic Data Analyst, working directly for the Chief Academic Officer.

Policy Context

In 2010 the board of education specifically identified College and Career Readiness as a Key Performance Indicator for the district. While college and career readiness was a goal for the district, a significant number of USD students were failing to graduate from high school. In SY 2011–12, the Four-Year Adjusted Cohort Graduation Rate was 72.9%. In fact, further analysis revealed that about 20% of first-time 9th graders were being retained each year. Past district data showed that the majority of 9th grade repeaters failed to graduate from high school. District leadership decided to focus on 9th grade promotion as a priority for the district. Specifically, they decided that a new Early Warning Indicator (EWI) system would be designed to predict which students were most at risk of being retained in 9th grade.

USD had previously developed an early warning “Watch List” classification system. However, an analysis of this system conducted by the USD Department of Research & Evaluation
found that the implementation of this system was “severely flawed.” Use of this early warning system had fallen over time.

District leadership and the SDP Fellows decided to create a new and improved Early Warning Indicator system. This new system was based on the same general concept as the earlier model: eighth grade performance data can help predict ninth grade performance. However, the technical components of the new Early Warning Indicator system were not based on the Watch List model. In addition to the new model, there would be a deliberate systemic emphasis on the importance of 9th grade success and how the early warning data could help schools focus these efforts.

The general concept of this EWI system was based on the national literature on early warning systems: a student’s performance in school is often a good predictor of their future school performance. Allensworth and Easton (2007) shows that 9th grade performance is a strong predictor of high school graduation in Chicago Public Schools. Von Secker (2009) shows how Montgomery County Public Schools (MCPS) expanded this concept by creating “college readiness” benchmarks along the K–12 continuum. MCPS used predictive analytics to create these “Seven Keys”, providing a trajectory for students to be college-ready by the end of high school. Many early warning systems used similar variables in these models: course grades, attendance, and sometimes standardized test scores and discipline data.¹ The SDP Fellows decided to examine past USD data to customize the EWI model for USD.

**Project Scope and Timeline**

During the discussions at the SDP Convening in May 2013, the USD team comprised of SDP Fellows, the Chief Academic Officer/Acting Deputy Superintendent and the Director of Testing decided to implement a new early warning system for school year 2013–14. Since there were only three months remaining before the start of the new academic year, the team members decided that the best strategy would be to score a “quick win” to establish the new early warning system. Their goal was to initiate a simple, yet improved, early warning system that focused on middle school and 9th grade students. This system would use 9th grade promotion as its desired outcome. Early Warning Indicator Reports (EWIR) would be created for incoming 9th graders, as well as incoming 7th and 8th graders. The team believed that middle schools were crucial in preparing students to succeed in 9th grade. Examining past PGCPS data to customize the EWI model for the district, Unnamed 3 ran logistic regressions with 9th grade promotion as the dependent variable, the outcome they were trying to predict. The key ¹ Allensworth and Easton (2005) shows the importance of course grades, course failures, and attendance in 9th grade. MCPS mainly used test scores and course grades in their “Seven Keys” (Von Secker 2009).
set of regressions used 8th grade academic performance as independent variables, the indicators that were being used to predict 9th grade promotion. The results of this analytic research were similar to those found in the literature (Allensworth and Easton 2005). Course grades from 8th grade were the best predictor of 9th grade promotion. Attendance and standardized test scores were less predictive than course grades but were still statistically significant factors in the regressions. Discipline, measured by number of suspensions since School Year 2008–09, was also statistically significant in most regressions.\(^2\) Table 1 below displays the results from the primary regression, a logit regression with 9th grade promotion as the dependent variable.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th Grade GPA</td>
<td>4.04***</td>
</tr>
<tr>
<td>Average GPA of 8th Grade Class at Student’s Middle School</td>
<td>0.44***</td>
</tr>
<tr>
<td>Attendance Rate * 10</td>
<td>1.78***</td>
</tr>
<tr>
<td>MSA Math Score</td>
<td>1.01***</td>
</tr>
<tr>
<td>MSA Reading Score</td>
<td>1.01***</td>
</tr>
<tr>
<td>Total # of Suspensions since SY 2008-09</td>
<td>0.94**</td>
</tr>
<tr>
<td>Constant</td>
<td>0.00***</td>
</tr>
</tbody>
</table>

* Sig. at the 5% level; ** Sig. at the 1% level; *** Sig. at the 0.1% level

Note: 9th grade promotion is the dependent variable. It equals 1 if the 9th grade student is promoted to the 10th grade, and it equals zero if the student is retained or dropped out. (Retention was a much more common outcome than dropping out for first-time 9th graders.)

The regression from Table 1 examines the relationship between 8th grade data and 9th grade promotion for the cohort of students who were first-time 9th graders in SY 2012–13. Other regressions, one with 7th grade data and one with 6th grade data, also predicted the promotion rate of this same cohort of first-time 9th graders. Using the fitted values from these regressions, Unnamed 3 derived coefficients that could be applied to the incoming 7th, 8th, and 9th graders to give them a “promotion probability,” the probability that they will pass 9th grade their first time given their most recent data. For example, each of the SY 2013-14 incoming 9th grade students now had a promotion probability that was between 0% and 100%. (See Appendix A for the calculations used to create promotion probabilities using the logit regression coefficients.)

In order to show these data in a way that was familiar and accessible for principals and other school staff, the Fellows created color-coded risk categories: red, yellow, and green. The red category indicated “high-risk” students, those with less than a 70% chance of passing 9th grade. The yellow

\(^2\) Multiple years of suspension data were included to increase the variation between students. However, some students had been attending USD schools since School Year 2008–09 or earlier, while others had transferred into the system after that school year, making direct comparisons misleading. For this reason, the EWI model for SY 2014–15 will include number of suspensions during the previous school year (SY 2013–14) only.
category represented “moderate-risk” students, those with a 70-95% chance of passing 9th grade. The green category represented the “low-risk” students, those with a 95% chance of passing 9th grade or higher. See Appendix B and Appendix C for examples of the Early Warning Indicator Reports with the color-coded risk categories.

In early August 2013, school-level reports were created, listing each incoming 9th grader, their risk category, and their feeder school. The production of the raw reports was automated, but Unnamed 2 manually added some formatting and aesthetic elements to make the reports easier to read and understand. He then disseminated the reports to each high school principal in mid-August 2013 prior to the first week of the new school year. The Fellows soon decided to further enhance the reports with additional information by including the promotion probability and the relevant 8th grade data contained in the model: GPA, attendance, test scores, and number of suspensions. They distributed the expanded set of reports during the first week of the school year (See Appendix B for an example of one of these “improved” EWI Reports sent to high schools). The reports for the 7th and 8th graders, with a full set of data, were sent to middle school principals in mid-September.

District leadership charged each high school with the goal of reducing its 9th grade retention rate from the previous school year by five percentage points. The Associate Superintendents and the Instructional Directors, who are the principals’ direct supervisors, monitored the principals throughout the year to observe what strategies were used to support students identified as at-risk of repeating the 9th grade. While the Instructional Directors were tasked with checking to ensure that the principals were implementing interventions to help these students, the principals were given discretion and flexibility to determine how they wanted to intervene. In February and March, Unnamed 2 began surveying the principals via face-to-face interviews to learn what interventions they put in place. He also conducted focus groups with school staff and 9th grade students to collect information on the interventions implemented and perceptions of their effectiveness.

At the end of each quarter of the 2013–14 school year, updated EWI reports were sent to all middle and high school principals. These reports were based on updated regressions, which factored in the most recent GPA and attendance data. The updated regressions for Q1 examined how 9th grade promotion (in SY 2012–13) related to Q1 data from that school year, as well as some data from the previous year. The new reports displayed the initial promotion probability and risk category from the beginning of the year, the academic data from the previous school year, as well as the new promotion probability and risk category, and new academic data. Using these reports, school staff could observe whether students were improving their likelihood of passing 9th grade each quarter. One clear sign of
improvement was the number of students who exited the red, high-risk category. The updated EWI reports were provided to principals four times over the course of the year: after the progress report distribution halfway through the first quarter and after every report card distribution at the end of quarters 1, 2, and 3. (See Appendix C for an example of a 9th grade EWI report from Q1).

The support of key stakeholders was essential throughout the rollout of the new EWI system. The advocacy of the Chief Academic Officer and supervisor of the SDP Fellows was crucial to getting the EWI system off the ground, and his support helped district leaders maintain a focus on this initiative. There were several major changes in district leadership that occurred just before and during SY 2013–14. Dr. Anonymous was announced as the new CEO on June 28, 2013, and Dr. Anonymous 2 was named Deputy Superintendent in August 2013. The Chief Academic Officer provided critical support for the EWI system during a period of significant transition. Unnamed 2 had strong collaborative relationships with the high school principals, who were also key stakeholders. Through working with district leaders and elementary school faculty, Unnamed 1 helped promote the conceptual bridge between students’ academic and social-emotional experiences in elementary school and their readiness for middle and high school.

**Results/Impact**

At the time of this report, SY 2013–14 has ended, but the final 9th grade promotion rate is not yet available because there are students who will be promoted due to their progress in summer school. However, the preliminary 9th grade promotion rate is 79.7%. This is a 4.2 percentage point increase from SY 2012–13, and the summer school promotions may increase the rate by several percentage points. It is possible that the promotion rate will surpass the SY 2007–08 promotion rate of 82.7%, the highest 9th grade promotion rate on record. Figure 1 shows a three-year time trend in the 9th grade promotion rate for USD and for the entire state. The district’s promotion rate has been increasing steadily, narrowing the gap between USD and the state.

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3 There are currently 494 9th graders in summer school or credit recovery. If all of them are promoted, it would increase the promotion rate to 84.3%. In past years, the vast majority of 9th graders in summer school were promoted to the 10th grade. If only 80% of the 9th graders are promoted, the promotion rate would be 83.4%.
The feedback received from principals and other school administrators has been quite favorable. Many principals expressed their feelings of excitement each time they received the updated EWI Report. Principals provided the following statements regarding the importance of the EWI Reports:

“The EWIR has assisted in providing us with the ability to have a laser-like focus on identifying and providing intervention to our at-risk population. It has been an invaluable tool in helping to reduce our 9th grade retention rate.”

“The report was extremely useful for guiding the courageous conversations necessary to move student improvement. Parents were impressed and supportive with the information we had about their child and the interventions that we recommended. The report helped teachers and administrators have a focus on the specific needs of these students.”

“The EWIR data was utilized for identification of students that were in need of additional support in the areas of organization, writing, self-esteem, English 9 requirements and other content areas. A support team was formed of administrators, counselors, the PPW [Pupil Personnel Worker] and English 9 teachers. The quarterly disaggregated data provided was used primarily to actively monitor the progress of yellow and red students to ensure that they [were] successfully moving towards completion of ninth grade. EWIR was invaluable to the success of our school.”
“The EWIR assisted our ninth grade academy with analyzing the progress of our ninth grade students over the course of the school year using one resource document. The EWIR allowed us to measure multiple metrics of student success in one place. As a result, successes were celebrated and positive behaviors reinforced, and interventions were applied to students who continued to struggle.”

In addition to the EWI Reports, there were complementary supports that also focused on 9th grade success. Ninth graders must pass English 9, or an ESOL (English for Speakers of Other Languages) English course, in order to be promoted to 10th grade. Each grading period, the Fellows produced additional reports showing the English 9 grade distribution by high school, which included the number of students failing. The district also sent English instructional specialists to two high schools that had struggled with 9th graders the previous year. This multi-tiered focus on 9th grade helped promote the use of the EWI system among school staff.

**Next Steps**

The EWI model was **updated for school year 2014–15**, with the updated regressions using the data from the SY 2013-14 9th graders. One major change to the model itself was the removal of the state standardized test scores. The state is switching to the Common Core, and the State School Assessment (SSA) was phased out in preparation for the PARCC assessment. The new model will include Lexile scores from the Scholastic Reading Inventory (SRI) test. The SRI data is a reasonable substitute for the SSA scores because the SRI had become a districtwide focus in SY 2013–14.

In addition, further thought was required about how to address students with missing data. The initial EWI Reports omitted any first-time 9th graders that were missing data required for the model. So these reports excluded all 9th grade students who were newly enrolled in the district. In addition, the reports excluded continuously enrolled students who were missing at least one data element, such as their SSA scores. On the first EWIR distributed at the beginning of School Year 2013–14, approximately 13% of first-time 9th graders were either newly enrolled or were missing data and were therefore excluded from the reports. The Q2 and Q3 reports included these “missing data” students, but they usually did not have promotion probabilities and risk categories, and they were placed on a separate tab with all of their existing data. The new model for SY 2014–15 captures some of these students by running an alternate model for some students with missing data. The alternate model excluded the SRI Lexile variable, so students with missing SRI scores could still be included in this model as long as they had complete GPA, attendance, and discipline data.

The district would also benefit from **automating the process further**. In the first year, the Fellows spent a significant amount of time formatting Excel files manually. Displaying the EWI data
online as part of the district’s Data Warehouse would improve the efficiency and convenience of the EWI process.

In the first year implementing the EWI system, principals were given considerable flexibility to identify interventions for at-risk students and implement these interventions. District leadership had to decide whether the second year of this program would operate in this same way. **The district leadership has decided to add some structure to the process that schools must use when analyzing the EWIR data, but they will not specify which interventions schools should use to help their at-risk students.** School-based teams will conduct root-cause analyses by digging deeper into the cumulative files of each at-risk student, and they will identify the appropriate intervention(s) for each student. This additional structure is meant to ensure that school teams are using the EWIR data to implement strategies with fidelity.

The district will also have the opportunity to expand and improve the system in other ways. In the first year, the system focused on grades 7–9. The **system could be expanded to include other grade levels.** New outcome variables could be chosen to best match the grade levels used. For grades 10–12, high school graduation or college enrollment would be logical outcomes. For elementary grade levels, benchmarks based on test scores or course grades could be used. The EWI system provides a framework for a deeper analysis of the data and aligned work relative to student learning and instructional effectiveness. For example, future predictive analytic work could **focus on specific academic skills or content standards.** In addition, socio-emotional skills are crucial during the 9th grade transition and throughout the entire school trajectory.4 Sims has begun to map out the theoretical framework around how these foundational academic skills and socio-emotional skills relate to future academic success. Future predictive analytic work could incorporate student perception and engagement data currently being collected as part of the teacher evaluation system. These socio-emotional data could be integrated in the existing predictive model, or more schools could implement interventions designed to address the socio-emotional needs of their students.

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4 Farrington et al. (2012) provides a comprehensive overview of the role of “noncognitive” factors in education. Tough (2014) focuses on examples of how socio-emotional factors affect the transition to college.