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Data Analysis:

Trends from the 2016 Smarter Balance Test Elementary School Report Cards of the Rapid City Area Schools

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The following data set is a compilation of the “Report Card” given to each school in South Dakota by the SD Department of Education after students complete the Smarter Balance standardized tests. This test determines student’s proficiency in Math and English, specifically reading and writing. The data originally presented could be potentially confusing to School Boards who wish to improve these test scores. The purpose of the following analysis is to help the Rapid City Area Schools Board of Education understand some of the causes of low test scores. The School Board might currently wonder “How does attendance in school affect student test scores?” or “What factors contribute to high test scores?” or “How do Title 1 Schools preform compared to other schools?”

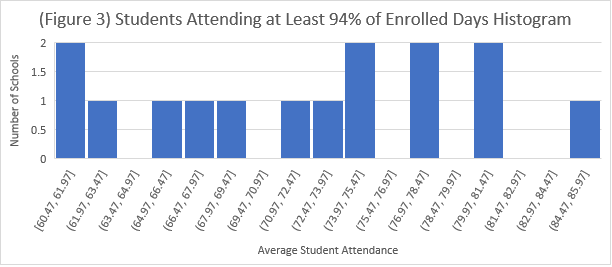
All 15 Elementary Schools in the Rapid City Area Schools are represented in this data set so the entire population is represented. Some of the variables of interest are the percent of the Students who attended 94% or more of enrolled days, percent of native American Students, percent of GAP students. In the data table, variable numbers are in percent units.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Elementary Test Scores in RCAS | | | | | | |
| School | Total Enrollment | Title 1 (Y=1/N=0) | Percent GAP (%) | Percent Native American (%) | Percent Attending 94% of Enrolled Days (%) | Multi Year Math Proficiency (%) |
| Black Hawk | 482 | 0 | 50.21 | 6.43 | 77.39 | 36.9 |
| Canyon Lake | 417 | 1 | 68.82 | 21.34 | 67.63 | 46.60 |
| Corral Drive | 502 | 0 | 22.91 | 2.19 | 85.26 | 71.60 |
| General Beadle | 591 | 1 | 100.00 | 63.96 | 60.91 | 20.16 |
| Grandview | 519 | 0 | 53.18 | 16.57 | 75.34 | 44.04 |
| Horace Mann | 387 | 1 | 100.00 | 44.96 | 60.47 | 36.84 |
| Knollwood | 550 | 1 | 100.00 | 54.91 | 63.45 | 33.73 |
| Meadowbrook | 564 | 0 | 40.96 | 8.69 | 80.14 | 62.07 |
| Pinedale | 440 | 0 | 34.77 | 2.73 | 80.45 | 63.38 |
| Rapid Valley | 591 | 1 | 55.33 | 9.98 | 77.83 | 37.60 |
| Robbinsdale | 517 | 1 | 100.00 | 29.21 | 66.34 | 50.65 |
| South Canyon | 294 | 1 | 58.84 | 9.64 | 72.11 | 55.65 |
| South Park | 390 | 1 | 100.00 | 35.38 | 68.97 | 34.46 |
| Valleyview | 704 | 1 | 63.21 | 18.61 | 75.43 | 50.39 |
| Wilson | 397 | 0 | 55.92 | 20.40 | 72.54 | 52.96 |
| District Total | 7345 | 9/15 |  |  |  |  |
|  |  |  |  |  |  |  |
| **Weighted Mean** |  |  | **66.79** | **23.42** | **72.51** | **46.06** |
| Minimum |  |  | 22.9084 | 2.19 | 60.47 | 20.16 |
| Maximum |  |  | 100 | 63.96 | 85.26 | 71.6 |
| Standard Deviation |  |  | 25.72 | 18.46 | 7.25 | 13.13 |

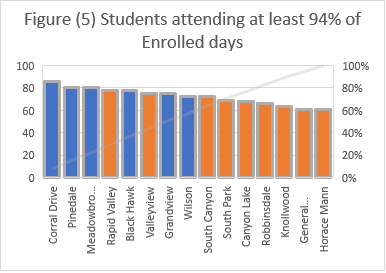
Figure one shows all of the school’s data from the 2016 Smarter Balance Test report cards. Highlighted for each variable is the minimum and maximum. Also beneath the graph the weighted mean, minimum, maximum, and standard deviations are shown. Nine of the fifteen schools are shown to be Title 1 schools (1) or Non-Title 1 schools (0). Title 1 schools are defined as schools with high numbers or high percentages of children from low-income families. Another variable is the percent of GAP students or stundents who are part of one or more of the following subgroups: American Indian or Alaskan Native, Black, Hispanic, English Language Learners, Students with Disabilities, and Economically Disadvantaged Students.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Figure 2: Correlation Coefficient Comparison | GAP Students to Math Proficiency | Native American Students to Math Proficiency | Attendance to Math Proficiency | GAP Student to Attendance | Percent Native American Students to Attendance |
| Correlation Coefficient | -0.748 | -0.763 | 0.724 | -0.936 | -0.90395 |

Figure 2 shows us the correlation between a few of the variables. The most interesting correlation is that attendance and math proficiency have a positive correlation. Attendance and percent GAP students have a high negative correlation. Also, Percent GAP students and Math Proficiency have a high negative correlation. Figure 3 is histogram that shows the distribution of school’s average attendance in the district.

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This data set and graphs show us that attendance plays a large role in the student’s success on the Smarter Balance Math section. Figure 5 shows the schools that have the highest attendance. The top 2 are Corral Drive and Pinedale while the bottom 2 are Horace Mann and General Beadle. Then looking at the figure 4 we can see that Corral Drive and Pinedale also have the highest math scores. On the other hand, General Beadle has the lowest test scores and Horace Mann has the 4th worst test scores. According to this analysis high attendance does lead to high test scores and high test scores are not likely to drive high attendance.

While attendance is important to consider, the Title 1 schools all have lower test scores and lower attendance than Non-Title 1 schools. The minority population in the Title 1 schools could be affecting both attendance and test scores. In order to control for this variable, we would have to compare the data about test scores, attendance, and GAP and non-GAP students.

As show on figure 5 the attendance at non-title one schools on average is higher than the attendance at Title one schools. This is most likely caused by an increase in parental engagement and understanding of the importance of education in the Non-Title one schools. Despite being the school with the best attendance Corral Drive only has 85% of students attending 94% of school days. So on both ends of the socioeconomic spectrum students are missing school and resulting in lower test scores. The school board and teachers need to consider policies and programs that will help increase attendance in all classrooms.

**Executive Summary**

The data set and analysis above was created in an effort to understand the effect of attendance on math proficiency scores of elementary students in the Rapid City Area Schools District. It was created to answer the RCAS Board of Education’s potential questions by looking at student attendance and the 2016 multi-year math proficiency sores. The difference between Title-one schools and other schools was also considered. Specific questions included: “How does attendance in school affect student test scores?” or “What factors contribute to high test scores?” or “How do Title 1 Schools preform compared to other schools?”

Further analysis of the data yielded some key findings. First, the data shows that there is a very strong correlation between attendance and math proficiency. On a scale of -1 to 1, where -1 is completely negatively correlated and 1 is completely positively correlated, attendance and math have a correlation of 0.724, which is very high. It was also found that 50% of the variance in test scores is related to attendance (r2). These two findings show that attendance is a key determinate in math proficiency.

The data also shows that the average attendance of students in Title-one schools is much lower than the average attendance in non-title one schools. Non-Title one schools had an average attendance of 78.52% while Title one schools had an average attendance of 68.13% exposing a 10% gap in attendance. A hypothesis test showed that this held true at least 95% of the time.

Specific policy implementations for this analysis were found using a simple regression model. The regression of the data shows that increasing attendance by 1 percent could potentially yield a 1.3 percent increase in math scores. If the RCAS district wants to increase math proficiency, then it should start experimenting with ways to increase student attendance. According to the regression, if attendance increases to 90%, average math proficiency could increase to at least 52% or to as much as 85%.

Overall this study shows that attendance is highly correlated with math proficiency and

that Title-one schools have a 10% lower average attendance than non-Title-one schools. Therefore, the District should increase its focus on incentivizing attendance in all schools but specifically in Title-one schools.

The data presented in the paper while insightful is not without limitations. Simply looking at attendance and test scores overlooks a lot of other key variables. For example, student’s parent income and education level, teacher quality, and classroom size can all play a role in math proficiency. Also, it should be noted that just because there is a strong positive correlation between attendance and math scores it doesn’t necessary mean that attendance causes high math scores. Children can come to class and still not learn anything. The RCAS District should try to find ways to increase attendance and watch the data to see if math proficiency actually increases when attendance increases. It would also be helpful to examine the correlation of attendance to math proficiency within each individual grade as well as within specific ethnic groups such as Native Americans. Once those data sets have been analyzed the District would be able to formulate specific policies for reaching each grade and ethnic group. These specific policies, when found would help the RCAS District increase its attendance and hopefully math proficiency.