

A Comprehensive Study of the Predictors of High School Outcomes: Why Some Students Graduate on Time While Others Drop Out

Introduction

In the 2007-08 school year, the Anchorage School District reported a dropout rate of 3.9 percent, representing 895 dropouts out of 22772 students enrolled in grades 7-12.

The purpose of the study is to explore the factors that are associated with high school students' high school outcomes. In other words, we are trying to identify the characteristics that distinguish high school students who graduate in four years from high school students who drop out. We also hope to discover some timely predictors within students' 8th or 9th grade that indicate students' progress toward high school graduation. The finding of this research may help high school teachers and administrators identify students with a high risk of dropping out and work with parents to help those students graduate.

Previous research

There have been several research studies that focused on students who have dropped out of school. For example, a study conducted by the University of Chicago revealed that students who have completed enough credits by the end of freshman year and who have failed no more than one semester of a core subject area were very likely to graduate on time. Those two indicators have also been used as the on-track indicators for Chicago public high schools.

Neild and Herzog, in their study of high school students in the Philadelphia School District, found out that 8th graders who attended school less than 80 percent of the time, or who received an F in mathematics or English had at least a 75 percent chance of dropping out of high school. Findings from the Philadelphia study also suggested important indicators of at-risk students in grade 9: attending school less than 70 percent of time, earning fewer than two credits, and not being promoted to the 10th grade on time.

Both the Philadelphia and Chicago studies pointed out that absenteeism in the freshman year was a predictor that a student will likely drop out later.

An analysis conducted by the Juneau School District studied students who dropped out from 1999-00 to 2004-05 school years. Their findings suggested that Alaska Native youth dropped out at a higher rate than other race/ethnicity groups. Other findings indicated that the majority of the dropouts were proficient in reading, writing and mathematics on the Standards Based Assessment, and that the majority of the dropouts left in grade 9 or grade 10.

A study conducted by Bridgeland, Dilulio, and Morrison in conjunction with the Gates Foundation reported that while some students dropped out because of significant challenges, most dropouts were students who could have, and believed they could have, succeeded in school.

The analysis conducted by Kennelly and Monrad has shown that students with prior behavior problems were likely to fail during transition years and eventually drop out. There appears to be a window of opportunity in reaching grade 8 and grade 9 students who show signs of poor behavior but who are not yet failing academic subjects.

A cohort study conducted by Celio for the Kent School District in the state of Washington had the following findings: middle school grades and test scores can provide early warning signs; 9th grade academic performance is a powerful predictor of at-risk students; failing a course in the first semester of 9th grade, getting Fs in 9th grade, and earning less than a 1.9 GPA in 9th grade are early indicators of at-risk students.

Descriptive Statistics of the Cohort Group

The cohort group in the study

This longitudinal study follows the cohort group of 8th graders in the 2003-04 school year. The cohort group is tracked as 8th graders in 2003-04, 9th graders in 2004-05, 10th graders in 2005-06, 11th graders in 2006-07 and 12th graders in 2007-08. Students who graduated by the 2007-08 school year are identified as the graduate group and students who dropped out between 2003-04 and 2007-08 school year are identified as the dropout group. Fifth-year seniors in the 2008-09 school year are excluded from the study, as well as students who transferred in and out of ASD between 2003-04 and 2007-08. In total, 4365 students were enrolled as 8th graders in 2003-04.

Three ways to report dropouts

In this report, the dropout numbers are reported in three different ways and it is essential to understand the differences between the numbers:

1. For the student cohort, a total of 774 students dropped out of school at least once from 2003-04 to 2007-08. Some of these 774 students dropped out and never returned, but some dropped out, reentered and graduated in four years. In other words, having a dropout record does not imply that the student dropped out and never returned. These 774 students will be referred as students who have a dropout record.
2. Among the 774 students who have a dropout record, 541 students never reentered the school system after their last dropout incident. These 541 students will be referred as students who dropped out and never returned after the last incident of dropping out.
3. Among the 774 students, some dropped out only once, but others dropped out more than once. In total, there were 1082 incidents of dropping out made by the above-mentioned 774 students.
4. These three numbers: 774 students who have a dropout record, the 541 students who dropped out and never returned after the last incident of dropping out, and the 1082 incidents of dropping out, will appear multiple times in this report. It is very important to understand the differences between these three numbers.

The final high school outcomes of the cohort group

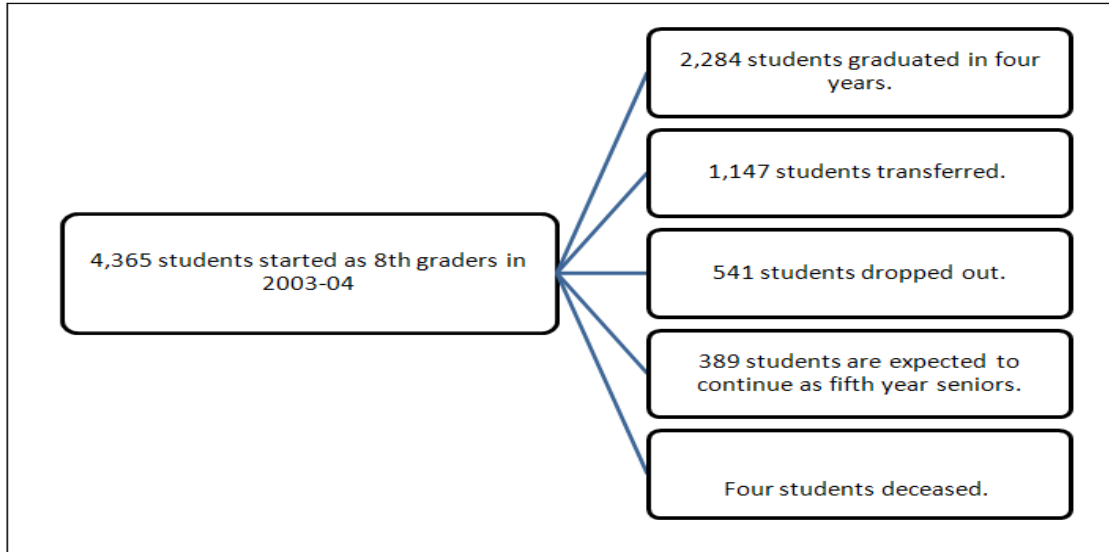
Table 1 presents an overall picture of the final high school outcomes of the 4365 students who were enrolled as 8th graders in 2003-04. This table indicates the status of the students in the cohort at the end of 2007-08 school year. Among the 4365 students, 2284 students graduated, 1147 students transferred out of the ASD, 541 students dropped out and never returned after the last incident of dropping out, 389 students were expected to continue as fifth year seniors, and 4 students deceased. Among the 389 students who were expected to return as fifth year seniors in 2008-09, 287 students actually returned.

Table 1: Final High School Outcomes of 8th Graders in 2003-04

	Number of Students	Percent of Total
Graduates	2284	52.3%
Transfers	1147	26.3%
Dropouts	541*	12.4%
Continuing Students (Students Who Actually Returned in 2008-09)	389 (287)	8.9% (6.6%)
Death	4	0.1%
Total	4365	100.0%

*Students who dropped out and never returned after the last incident of dropping out.

Figure 1: Final High School Outcomes of the Students in the Study



Students who dropped out, returned and graduated

Among the 774 students who reported at least one incident of dropping out, 46 students graduated within four years, representing 5.9 percent of the group.

Table 2: Number of Students Who Dropped out, Reentered and Graduated in Four Years

Students who dropped out, reentered and graduated in four years	46	5.9%
Total students who dropped out at least once.	774*	100.0%

*Students who have a dropout record. Some of these 774 students later reentered the school system.

Incidence rates of students who dropped out

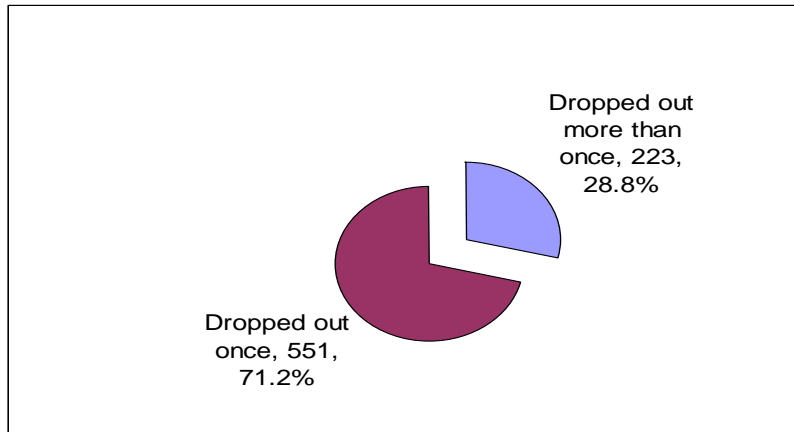
There were 1082 incidents of dropping out made by 774 students who have a dropout record. The difference reflects that some of the students dropped out more than once from the school system. Specifically, among the 774 students, 551 dropped out only once and 223 students dropped out more than once.

Table 3: Number of Students in the Cohort Group Who Dropped out from 2003-04 to 2007-08

	Number of Students	Percent of Total
Dropped out more than once	223	28.8%
Dropped out once	551	71.2%
Total students who dropped out at least once	774*	100.0%

*Students who have a dropout record. Some of these 774 students later reentered the school system.

Figure 2: Incidence Rates of Students Who Dropped out



Breakdown of the dropouts by designated student groups

Table 4 is the breakdown of the 541 students who dropped out and never returned after the last incident of dropping out by designated student groups and table 5 is the breakdown of the 774 students who have a dropout record, some of which later reentered the school system, by designated student groups. The majority of the students who dropped out and never returned after the last incident of dropping out are White students (46.2 percent of the group). It is interesting to note that 23.7 percent of the dropouts are Alaska Native and American Indian students, almost double the percentage of Alaska Native and American Indian students in the student cohort (23.7 percent compared to 13.7 percent, see table 4 and 6). This confirms the finding of the Juneau study that Alaska Native and American Indian students drop out at a higher rate than other race/ethnicity groups.

The percentage of low income students among the students who dropped out and never returned after the last incident of dropping out is also higher than the percentage of students in the grade 8 cohort (47.5 percent compared to 27.1 percent, see table 4 and 6). Table 4 also indicates that females are slightly more likely to drop out than males, with females representing 54.3 percent of the dropouts and males representing 45.7 percent.

Table 4: Breakdown of the 541 Dropouts Who Never Returned by Designated Student Groups

Category	Count	Percent of Dropouts
Total	541*	100.0%
African American	51	9.4%
Alaska Native /American Indian	128	23.7%
Asian/Pacific Islander	63	11.6%
White	250	46.2%
Hispanic	28	5.2%
Multi-Ethnic	21	3.9%
Low Income	257	47.5%
Special Education	91	16.8%
Bilingual	77	14.2%
Migrant	22	4.1%
Female	294	54.3%
Male	247	45.7%

*Students who dropped out and never returned after the last incident of dropping out.

Table 5: Breakdown of the 774 Dropouts by Designated Student Groups

Category	Count	Percent of Dropouts
Total	774*	100.00%
African American	81	10.50%
Alaska Native /American Indian	194	25.10%
Asian/Pacific Islander	91	11.80%
White	339	43.80%
Hispanic	43	5.60%
Multi-Ethnic	26	3.40%
Low Income	375	48.40%
Special Education	124	16.00%
Bilingual	103	13.30%
Migrant	28	3.60%
Female	408	52.70%
Male	366	47.30%

*Students who have a dropout record. Some of these 774 students later reentered the school system.

Table 6: Breakdown of the Cohort of Grade 8 Students in 2003-04

Category	Count	Percent of Cohort
Total	4,365	100.00%
African American	359	8.20%
Alaska Native /American Indian	597	13.70%
Asian/Pacific Islander	496	11.40%
White	2,521	57.80%
Hispanic	264	6.00%
Multi-Ethnic	128	2.90%
Low Income	1,185	27.10%
Special Education	544	12.50%
Bilingual	441	10.10%
Migrant	105	2.40%
Female	2,223	50.90%
Male	2,142	49.10%

Final high school GPA of the 541 students who dropped out and never returned after the last incident of dropping out

Table 7 reports the final GPA of the 541 students who dropped out and never returned after the last incident of dropping out. The majority (72.8 percent) of the 541 students had a high school GPA less than or equal to 2.00 when they dropped out.

Table 7: Final GPA of Students Who Dropped out and Never Returned after the Last Incident of Dropping out

Final GPA	Count	Percent of Total
0.00-1.00	204	37.7%
1.01-2.00	190	35.1%
2.01-3.00	93	17.2%
3.01-4.00	54	10.0%
Total	541*	100.0%

*Students who dropped out and never returned after the last incident of dropping out.

Dropout categories

The dropout codes are reported by categories determined by ASD. Please note that the reporting of dropout codes has gone through some changes from 2003-04 to 2007-08. For example, starting in 2004-05 school year, summer leavers, or students who left at the end of the previous school year but did not come back in the new school year, are required to be coded as dropouts.

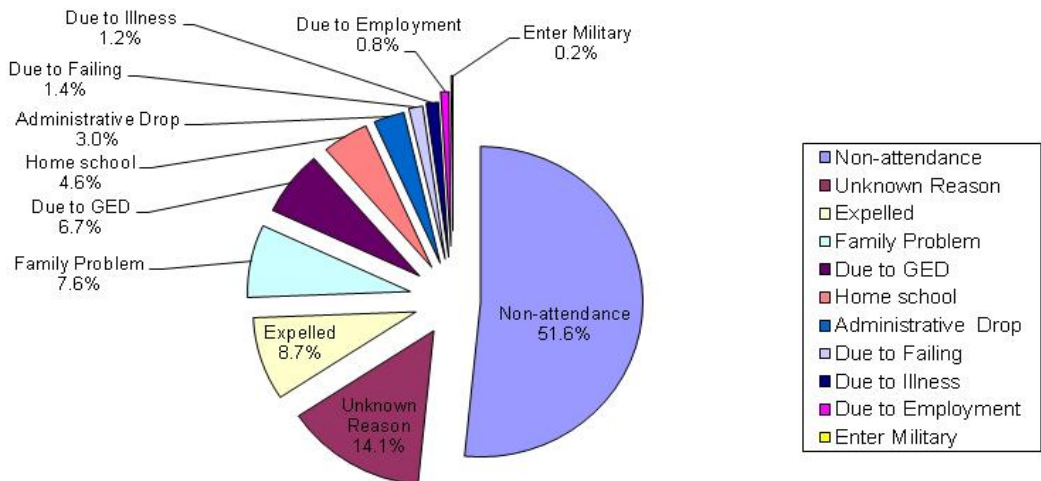
Table 8 reveals that, for the 1082 incidents of dropping out made by the 774 students who have a dropout record, the number one category for dropping out is “non-attendance” and the number two category for dropping out is “unknown reason”. This supports the research indicating that dropping out of school is a gradual disengagement rather than a single event. The reasons for dropping out are multi-faceted and typically result in attendance issues to some degree. Following is a breakdown of the dropout reasons of the 1082 dropout incidents.

Table 8: Breakdown of the Dropout Categories
of the 1082 Dropout Incidents

Dropout Categories	Count	Percent
Non-attendance	558	51.6%
Unknown reason	153	14.1%
Expelled	94	8.7%
Family problem	82	7.6%
GED	73	6.7%
Home school (non-district)	50	4.6%
Administrative drop	33	3.0%
Due to failing	15	1.4%
Due to illness	13	1.2%
Due to employment	9	0.8%
Enter military	2	0.2%
Total	1,082*	100.0%

*The total incidents of dropping out made by the 774 students who have a dropout record.

Figure 3: Reasons of the 1082 Incidents of Dropping Out



Assessment results

The proficiency levels of the dropout group and graduate group on the Alaska Benchmark assessment in 2003-04 are analyzed. While students in the graduate group perform much better than students in the dropout group, it is interesting to note that the majority of the students in the dropout group are proficient in the reading and writing subtests. Students in the dropout group are not performing as well in the math subtest with 45.1 percent of the group scoring proficient or above.

Table 9: 2003-04 Grade 8 Alaska Benchmark Test Proficiency Rates Between Students Who Dropped out and Students Who Graduated

		Reading		Writing		Math	
		Not Proficient	Proficient	Not Proficient	Proficient	Not Proficient	Proficient
		Percent	Percent	Percent	Percent	Percent	Percent
Outcome	Dropouts	45.3%	54.7%	38.6%	61.4%	54.9%	45.1%
	Graduates	17.2%	82.8%	9.8%	90.2%	19.6%	80.4%

The grade 9 and grade 10 SBA test results reveal a similar trend—students in the graduate group perform better than those in the dropout group, but the majority of the students in the dropout group are proficient in SBA reading test in both years. The dropout group does not perform as well in the SBA writing and math tests. In SBA writing, 58.5 percent of the dropout group are proficient in grade 9 and 45.7 percent are proficient in grade 10. In SBA math, 38.2 percent of the dropout group are proficient in grade 9 and 35.6 percent are proficient in grade 10. The overall proficiency rates of the graduates increase from grade 9 to grade 10 in all three subtests while the overall proficiency rates of the dropouts decrease in all three subtests.

Table 10: 2004-05 Grade 9 SBA Proficiency
Between Students Who Dropped out and Students Who Graduated

		Reading		Writing		Math	
		Not Proficient	Proficient	Not Proficient	Proficient	Not Proficient	Proficient
		Percent	Percent	Percent	Percent	Percent	Percent
Outcome	Dropouts	38.6%	61.4%	41.5%	58.5%	61.8%	38.2%
	Graduates	10.3%	89.7%	11.8%	88.2%	23.3%	76.7%

Table 11: 2005-06 Grade 10 SBA Proficiency
Between Students Who Dropped out and Students Who Graduated

		Reading		Writing		Math	
		Not Proficient	Proficient	Not Proficient	Proficient	Not Proficient	Proficient
		Percent	Percent	Percent	Percent	Percent	Percent
Outcome	Dropouts	38.8%	61.2%	54.3%	45.7%	64.4%	35.6%
	Graduates	8.3%	91.7%	10.8%	89.2%	21.6%	78.4%

The Alaska High School Graduation Qualifying Exam (HSGQE) is an essential skills test that students need to pass before they can be awarded a high school diploma. Students take the test starting in the spring of 10th grade. The majority of the dropout group were proficient in HSGQE reading, writing and math subtests.

Table 12: HSGQE Proficiency Comparison
Between Students Who Dropped out and Students Who Graduated

		Reading		Writing		Math	
		Not Proficient	Proficient	Not Proficient	Proficient	Not Proficient	Proficient
		Percent	Percent	Percent	Percent	Percent	Percent
Outcome	Dropouts	40.0%	60.0%	35.2%	64.8%	46.3%	53.7%
	Graduates	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%

When dropouts leave school

Table 13-17 and figure 4 report information on when students physically leave the school district. Table 13 indicates that the majority of the students leave in grade 9, grade 10 and grade 11. Specifically, 24.5 percent of the dropouts leave in grade 9; 23.9 percent and 23.8 percent leave in grade 10 and grade 11 respectively.

Table 13 reports the percent of dropouts by grade level based upon the 1082 dropout incidents of the cohort. Grades 9, 10, and 11 have similar rates around 24 percent when reported by incidents.

Table 13: The Grade at Which Students Dropped Out*
2003-04 to 2007-08

		Gender					
		Total		Female		Male	
		Number of Students	Percent of Total	Number of Students	Percent of Total	Number of Students	Percent of Total
Grade at Time of Drop	8	105	9.7%	62	10.5%	43	8.7%
	9	265	24.5%	136	23.1%	129	26.1%
	10	259	23.9%	134	22.8%	125	25.3%
	11	257	23.8%	144	24.5%	113	22.9%
	12	196**	18.1%	112	19.0%	84	17.0%
	Total	1,082***	100.0%	588	100.0%	494	100.0%

*Table 13 reports the grade level in which students dropped out for the 1082 incidents of dropping out. If a student dropped out more than once, each incident is reported separately.

**Table 13 reports that 196 incidents of dropping out occurred in grade 12 from 2003-04 to 2007-08. These incidents of drop were made by 163 students. The 2007-08 NCLB Summer Data Collection file reports that 390 students dropped out as 12th graders in 2007-08. The difference of 227 students is the students who dropped out as 12th graders in 2007-08 but who were not enrolled as 8th graders in 2003-04. Since the cohort for this study is 8th grader in 2003-04, these 227 students are not included in the study.

***The total incidents of dropping out made by the 774 students who have a dropout record.

Figure 4: Grade Level at Time of Drop

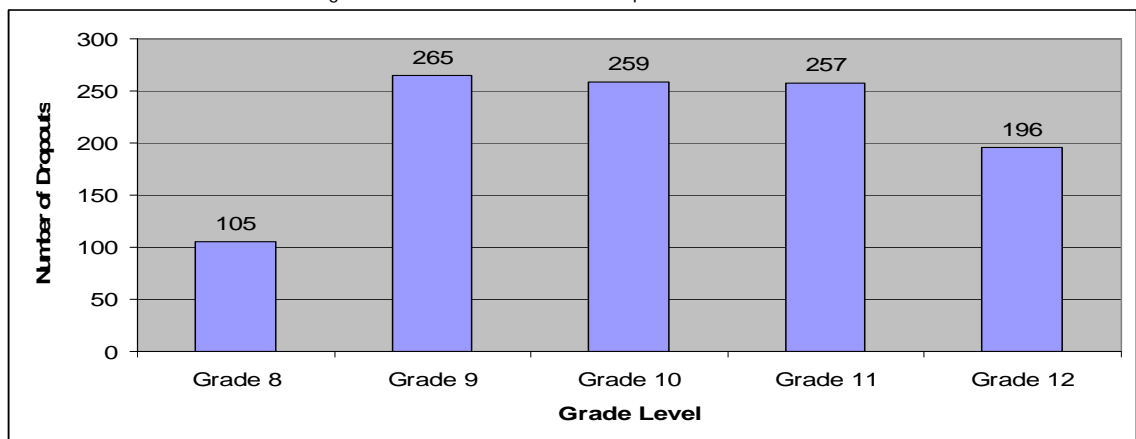


Table 14 reports, for the 541 students who dropped out and never returned after the last incident of dropping out, the percent of dropouts by grade level based upon their first reported dropout incident. Grade 9 has the highest percentage of students dropping out when reported by the first incident.

Table 14: The Grade in Which Students First Dropped Out for the 541 Students*
2003-04 to 2007-08

	Grade	Number of Students Who Dropped out	Percent of Total
Grade at Time of First Drop	8	60	11.10%
	9	137	25.30%
	10	128	23.70%
	11	106	19.60%
	12	110	20.30%
	Total	541**	100.00%

* If a student has multiple dropout records from 2003-04 to 2007-08, table 14 indicates the grade level in which the student's first dropout record is reported.

** Students who dropped out and never returned after the last incident of dropping out.

Table 15 reports, for the 541 students who dropped out and never returned after the last incident of dropping out, the percent of dropouts by grade level based upon their last reported dropout incident. Grade 12 has the highest percentage of students dropping out when reported by the last incident.

Table 15: The Grade in Which Students Last Dropped Out for the 541 Students*
2003-04 to 2007-08

	Grade	Number of Students Who Dropped out	Percent of Total
Grade at Time of Last Drop	8	20	3.7%
	9	105	19.4%
	10	117	21.6%
	11	135	25.0%
	12	164	30.3%
	Total	541**	100.0%

* If a student has multiple dropout records from 2003-04 to 2007-08, table 15 indicates the grade level in which the student's last dropout incident occurred.

** Students who dropped out and never returned after the last incident of dropping out.

Table 16 reports, for the 774 students who have a dropout record, the percent of dropouts by grade level based upon the first time the students dropped out of school. Grade 9 has the highest percentage of students dropping out when reported by the first incident.

Table 16: The Grade in Which Students First Dropped Out for the 774 Students*
2003-04 to 2007-08

	Grade	Number of Students Who Dropped out	Percent of Total
Grade at Time of Drop	8	89	11.5%
	9	219	28.3%
	10	182	23.5%
	11	150	19.4%
	12	134	17.3%
	Total	774**	100.0%

*If a student has multiple dropout records from 2003-04 to 2007-08, table 16 indicates the grade level in which the student's first dropout record is reported.

**Students who have a dropout record. Some of these 774 students later reentered the school system.

Table 17 reports, for the 774 students who have a dropout record, the percent of dropouts by grade level based upon their last reported dropout incidents. For this cohort, the highest rate was reported at grade 11 with 26.1 percent of the total.

Table 17: The Grade in Which Students Last Dropped Out for the 774 Students*
2003-04 to 2007-08

	Grade	Number of Students Who Dropped out	Percent of Total
Grade at Time of Drop	8	44	5.7%
	9	169	21.8%
	10	181	23.4%
	11	202	26.1%
	12	178	23.0%
	Total	774**	100.0%

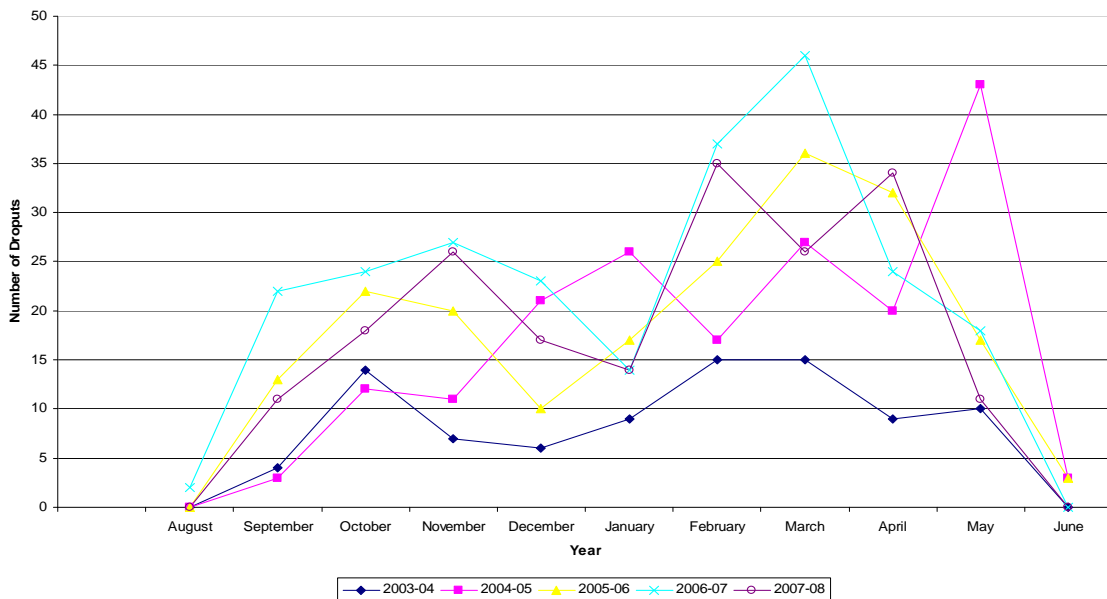
*If a student has multiple dropout records from 2003-04 to 2007-08, table 17 indicates the grade level at which the student's last dropout record is reported.

**Students who have a dropout record. Some of these 774 students later reentered the school system.

The month in which students dropped out

The dropout data is further analyzed to illustrate the dropouts by months from 2003-04 to 2007-08 (see figure 5 below). Based on the five-year average, March is the month with the highest number of dropouts (on average 30 students drop out in March); February is the month with the second highest number of dropouts (on average 26 students drop out in February). This figure indicates all incidents of dropping out for each year reported.

Figure 5: Dropouts by Month by Year*



* Summer leavers are excluded because they do not have withdrawal date.

Number of school changes in grades 9-12

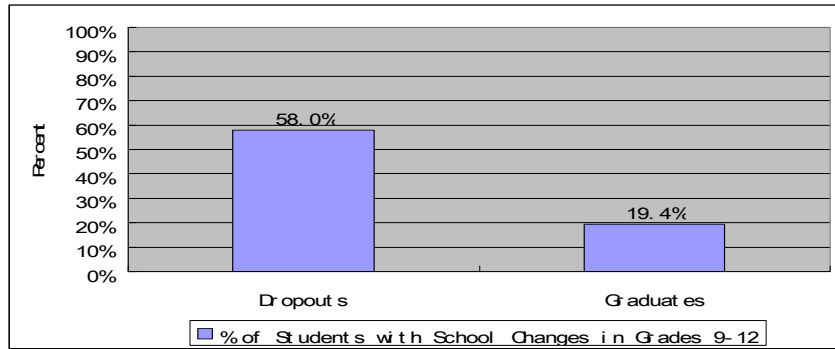
Table 18 reports the total number of school changes in grade 9-12 for the dropout group and the graduate group. The majority of the dropout group (58 percent) have changed schools in grades 9-12, and approximately 20 percent of the graduate group report school changes in grades 9-12.

Table 18: School Changes in Grades 9-12

	Number of Students	Students with School Changes in Grades 9-12	Percent of Total
Dropouts	541*	314	58.0%
Graduates	2284	444	19.4%

*Students who dropped out and never returned after the last incident of dropping out.

Figure 6: Percent of Students with School Changes in Grades 9-12 for the Dropout and Graduate Group



Regression Results

Several variables are found by previous research to be important predictors of students at-risk of dropping out. For example:

- Both attendance rates in grade 8 and grade 9 are found to be predictors of at-risk students. In this study, we need to find out which one is a better predictor to be included in the regression analysis.
- Similarly, several variables related to freshmen course repeats are suggested to be predictors—course repeats in core courses, in English course, in mathematics courses, or in English and mathematics courses. Correlation analysis is conducted to identify the best predictor among these four variables.
- For the same reason, we look at several variables related to course performance--the number of semester Fs received in grade 9 in core courses, in English course, in mathematics courses, or in English and mathematics courses.

Attendance rate

Based on research findings, two attendance rates are studied to explore which would be a better predictor—attending school less than 80 percent of the time that students are enrolled in grade 8 or attending school less than 80 percent of the time that they are enrolled in grade 9. The attendance rate is computed by taking the aggregate daily attendance (sum of the days present of each individual student when school is in session) and dividing by the aggregate daily membership (sum of the days present and absent of each individual student when school is in session).

A correlation analysis suggests that student attendance rate at grade 9 is a better predictor of high school outcomes. The correlation coefficient between grade 9 attendance rate and high school outcomes is 0.538, and the correlation coefficient between grade 8 attendance rate and high school outcomes is 0.413. The interpretation for the correlation coefficient is that the higher the coefficient, the stronger the relationship. Therefore attendance rate in grade 9 is a stronger predictor.

Table 19: The Correlation Coefficient between High School Outcomes and the Attendance Records

Correlation with High School Outcomes	Correlation Coefficient*
Attendance Records in Grade 9	0.538
Attendance Records in Grade 8	0.413

* For the correlation coefficient the higher the better. A higher coefficient shows a stronger relationship.

The correlation coefficient ranges from negative 1 to positive 1, where negative 1 indicates a perfect negative relationship and positive 1 indicates a perfect positive relationship. Following is the correlation coefficient categories:

Table 20: Correlation Coefficient Categories

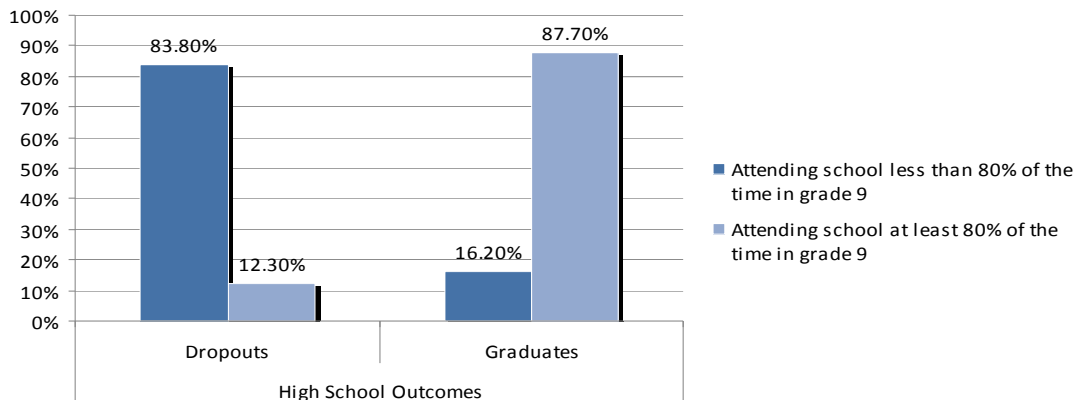
Correlation Coefficient	Category
0.9 to 1.0	Very strong positive correlation
0.7 to 0.9	Strong, high positive correlation
0.4 to 0.7	Moderate positive correlation
0.2 to 0.4	Weak, low positive correlation
0.0 to 0.2	Very weak to negligible positive correlation
0.0 to -0.2	Very weak to negligible negative correlation
-0.2 to -0.4	Weak, low negative correlation
-0.4 to -0.7	Moderate negative correlation
-0.7 to -0.9	Strong, high negative correlation
-0.9 to -1.0	Very strong negative correlation

The following table further analyzes the relationship between attendance rate in grade 9 and high school outcomes. Table 21 shows that among students attending school at least 80 percent of the time that they are enrolled in grade 9, 87.7 percent graduate on time. Among the students who attend school less than 80 percent of the time that they are enrolled in grade 9, only 16.2 percent graduate in four years. Students who attend school less than 80 percent of the time that they are enrolled in grade 9 are 6.8 times more likely to drop out than students who attend school at least 80 percent of the time that they are enrolled (83.8 percent compared to 12.3 percent).

Table 21: The Relationship between Attendance Rate in Grade 9 and High School Outcomes

Correlation with High School Outcomes		High School Outcomes	
		Dropouts	Graduates
Students attending school at least 80 percent of the time that they were enrolled in Grade 9 in 2004-05	No	83.8%	16.2%
	Yes	12.3%	87.7%

Figure 7: The Relationship between Grade 9 Attendance and High School Outcomes



Failure in courses

This study looks at the relationship between the failure rate in grade 9 and the high school outcomes. Four variables--the number of semester Fs in the core courses, the number of semester Fs in mathematics and English courses, the number of semester Fs in mathematics courses, and the number of semester Fs in English courses are analyzed to see whether one is a better predictor at identifying at-risk students than the other.

Based on the findings of the correlation study, the number of semester Fs received in the core courses is the best indicator because it has the highest correlation coefficient of 0.552 among the four variables.

Table 22: The Correlation Coefficient between High School Outcomes and the Number of Semester Fs in Courses

Correlation with High School Outcomes	Correlation Coefficient*
Number of Semester Fs in Core Courses	0.552
Number of Semester Fs in Math and English Courses	0.522
Number of Semester Fs in English Courses	0.477
Number of Semester Fs in Math Courses	0.450

* For correlation coefficient the higher the better. A higher coefficient shows a stronger relationship.

The following table further analyzes the relationship between the numbers of semester Fs students receive in grade 9 and their high school outcomes. For example, among the students who have less than two semester Fs in core courses in their freshmen year, 87.0 percent graduate in four years. If the students receive at least two semester Fs in core courses in grade 9, the likelihood of graduating in four years decreases by 71.4 percentage points (15.6 percent compared to 87 percent). A student with two or more semester Fs in grade 9 is six and a half times more likely to drop out than a student who receives less than two semester Fs in grade 9 (84.4 percent compared to 13.0 percent).

Table 23: The Relationship between the Number of Semester Fs in Grade 9 and High School Outcomes

	High School Outcomes	
	Dropouts	Graduates
Students Receiving Less Than Two Semester Fs in Grade 9	13.0%	87.0%
Students Receiving at Least Two Semester Fs in Grade 9	84.4%	15.6%

Figure 8: The Relationship between the Number of Semester Fs in Core Courses in Grade 9 and High School Outcomes

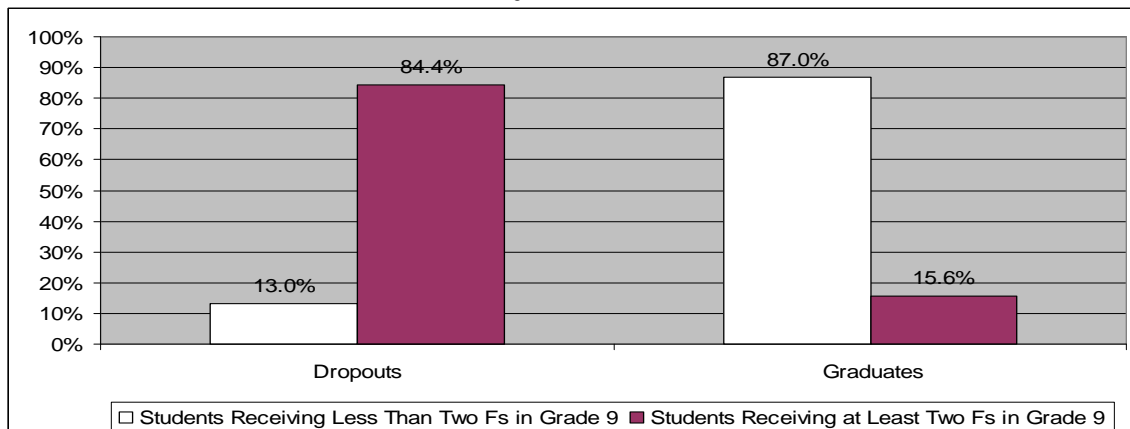
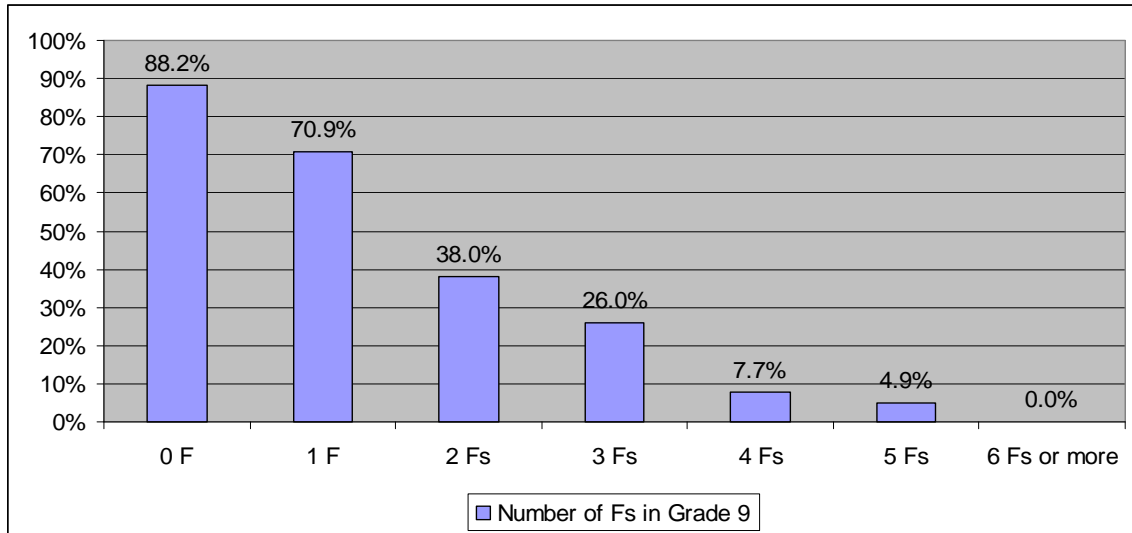


Figure 9 further analyzes the relationship between the number of semester Fs in core courses in grade 9 and whether the student graduates within four years. The relationship between number of semester Fs and graduation is very strong. The vast majority (88.2 percent) of students with no semester Fs in core courses graduate in four years. Students who receive just one F in core courses have a graduation rate 17.3 percentage points lower than students without semester Fs (70.9 percent compared to 88.2 percent). Students who receive two semester Fs in core courses are 50.2 percentage points less likely to graduate than students with no semester Fs (38.0 percent compared to 88.2 percent).

Figure 9: The Relationship between the Number of Semester Fs in Core Courses in Grade 9 and Whether Students Graduated in Four Years



Number of credits accrued in grade 9

Number of credits accrued in grade 9 has also been identified as an important predictor of high school graduation by several previous studies. The Chicago study used earning at least 5 credits in grade 9 (21 credits required for graduation) as an on-track indicator. Clearly, the more credits students earn in the freshmen year, the more likely they will graduate on time. The analysis suggest that 92.1 percent of the students who earn at least 5 credits in grade 9 graduate in four years, while 25.1 percent of the students who earn less than 5 credits in grade 9 graduate in four years. A student who earns less than 5 credits in grade 9 is nine and a half times more likely to drop out than a student who earns at least 5 credits (74.9 percent compared to 7.9 percent).

Table 24: The Relationship between High School Outcomes and Credits Earned

		High School Outcomes	
		Dropouts	Graduates
Credits Earned	Less than 5	74.9%	25.1%
	5 or More	7.9%	92.1%

Currently in the Anchorage School District, freshmen on-track are defined as students who have earned a minimum of 5.5 credits and failed no more than one semester of a core subject. To find out which is a stronger indicator--earning at least 5 credits in grade 9 or at least 5.5 credits in grade 9, we also study the relationship between high school outcomes and earning at least 5.5

credits in grade 9. The results show that 93.5 percent of the students who earn at least 5.5 credits in grade 9 graduate in four years. For students earning less than 5.5 credits in grade 9, 63.2 percent drop out.

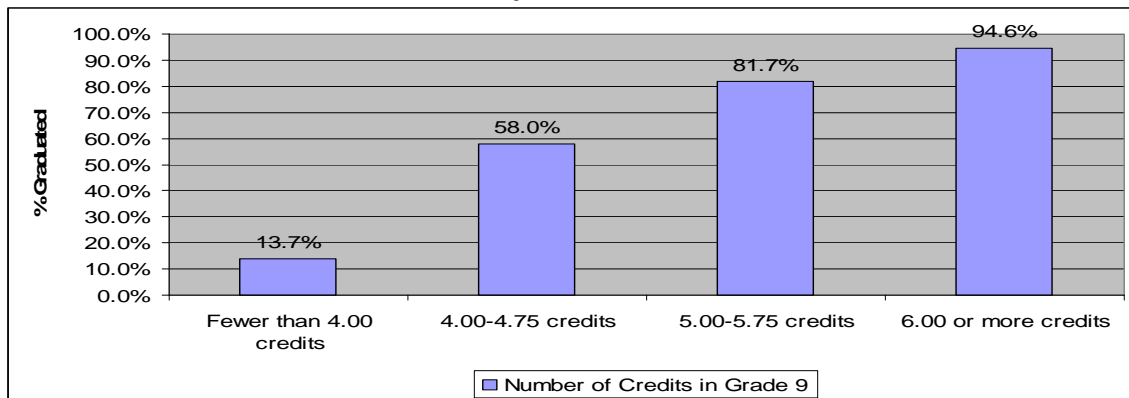
The analysis shows that earning at least 5 credits in grade 9 is a stronger predictor. The reason is that the on-track indicator is used to identify students at risk for dropping out and we need to select an indicator with a high probability of identifying at-risk students. If we use earning at least 5.5 credits in grade 9 as the predictor of students at risk of dropping out, 63.2 percent of the students that we predict as at-risk students actually drop out; if we use earning at least 5 credits in grade 9 as the predictor, 74.9 percent of the students that we predict as at-risk students actually drop out. Clearly, earning at least 5 credits in grade 9 is a stronger predictor.

Table 25: The Relationship between High School Outcomes and Credits Earned

		High School Outcomes	
		Dropouts	Graduates
Credits Earned	Less than 5.5	63.2%	36.8%
	5.5 or More	6.5%	93.5%

Using earning 5 credits in grade 9 as the predictor, students in the cohort group are further divided into four groups to look at the impact of credits earned in grade 9 and the high school outcomes. Figure 10 shows that for student with fewer than 4 credits in grade 9, only 13.7 percent graduate within four years. The graduation rate for students earning between 4 and 4.75 credits in grade 9 increases to 58.0 percent. The students who earn between 5 and 5.75 credits in grade 9 have a graduation rate 23.7 percentage points higher than students in the previous group (81.7 percent compared to 58.0 percent). For students earning at least 6 credits in grade 9, almost 95 percent graduate in four years.

Figure 10: The Relationship between the Number of Credits Earned in Grade 9 and High School Outcomes



Course repeats

We also study which variable in the number of course repeats in grade 9 is a better predictor of high school outcomes---course repeats in core courses, in mathematics courses, in English courses, or in English and mathematics courses. Based on the results of the correlation analysis, number of course repeats in math courses is the best predictor among the four with the highest coefficient of 0.108, but the relationship is not strong. Generally a correlation coefficient between 0.000 and 0.200 is considered a very weak relationship.

Table 26: The Relationship between Course Repeats and High School Outcomes

Correlation with the Student Outcome (Graduated or Dropped out)	Correlation Coefficient*
Number of Repeats in Math Courses	0.108
Number of Semester Fs in Core Courses	0.072
Number of Repeats in English and Math Courses	0.066
Number of Semester Fs in Core Courses	0.028

* For correlation coefficient the higher the better. A higher coefficient shows a stronger relationship.

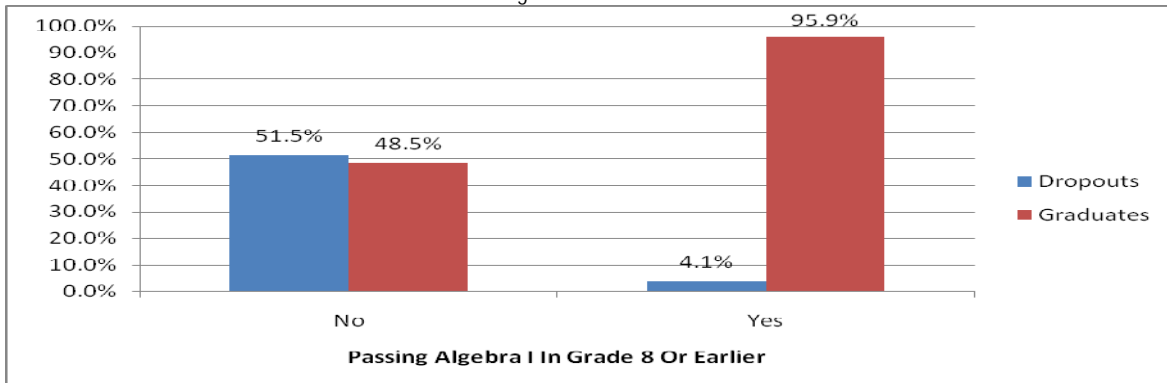
Passing Algebra I in grade 8 or earlier

The analysis also indicates that students who pass Algebra I in grade 8 or earlier are twice as likely to graduate in four years as students who do not pass Algebra I in grade 8 or earlier (95.9% compared to 48.5%)

Table 27: The Relationship between Passing Algebra I in Grade 8 or Earlier and High School Outcomes

Correlation with high school outcomes		High School Outcomes		
		Dropouts	Graduates	Total
Passing Algebra I in grade 8 or earlier	No	51.5%	48.5%	100.0%
	Yes	4.1%	95.9%	100.0%

Figure 11: The Relationship between the Number of Credits Earned in Grade 9 and High School Outcomes



Logistic regression used in this report

Generally, regression is used to study the relationship between a group of predictors and the dependent variable. The purpose of the multiple regression is to learn how much of the change in the dependent variable (high school outcomes) can be explained or predicted by the change in a group of predictors. If the dependent variable is a dichotomous, or two-level, variable such as high school outcomes, a logistic regression should be used. In our study, high school outcome is a dichotomous variable—students either drop out or graduate. Logistic regression uses the change in a group of predictors to predict the likelihood that a student will graduate in four years.

Regression results

After determining which factors to include in the model, the following are entered into a regression model to find out which factors are statistically significant predictors of high school outcomes (graduate or drop out). In making these decisions, we have to identify factors that have data collected systematically throughout the district.

Table 28: Variables in the Regression Model

Variables in the Model
Receiving less than 2 semester Fs in core classes in grade 9
Earning at least 5 credits in grade 9
Receiving a waiver in athletics
Attending school 80 percent of the time in grade 9
Students with school changes in grade 9
Suspensions in grade 9
Passing Algebra I in grade 8 or earlier
Course repeats in grade 9
Retained in grade 8
Took performance arts courses in grades 9-12
Took career tech courses in grades 9-12
Students with school changes in grades 9-12
Students' GPA in grade 9

In educational research, statistical significance reveals how often the results would be obtained by chance. If a predictor is significant at the .01 level, there is only 1 percent probability that the influence of the predictor on the high school outcomes is due to chance (rather than “real” influence). The results of the regression reveal that four predictors are statistically significant at .01 level ($p < .01$): receiving 2 semester Fs in core courses in grade 9, receiving at least 5 credits in grade 9, attending school at least 80 percent of the time in grade 9, and passing Algebra I in grade 8 or earlier. Another predictor is significant at the .05 level: students' GPA in grade 9.

Table 29: Regression Results

Variables	Significance	Statistically Significant
Receiving less than 2 semester Fs in core classes in grade 9*	0.000	Significant at .01 level
Earning at least 5 credits in grade 9*	0.000	Significant at .01 level
Attending school 80 percent of the time in grade 9*	0.001	Significant at .01 level
Passing Algebra I in 8th grade or Earlier*	0.003	Significant at .01 level
Students' GPA in grade 9**	0.043	Significant at .05 level
Receiving a waiver in athletics	0.059	No
Suspensions in grade 9	0.085	No
Course repeats in math in grade 9	0.102	No
Retained in grade 8	0.226	No
Took performance arts courses	0.278	No
Took career tech courses	0.291	No
Students with school changes in grades 9-12	0.336	No
Student with school changes in grade 9	0.403	No

* Significant at the .01 level

** Significant at the .05 level

Although we have already determined that earning at least 5 credits in grade 9 is a stronger predictor because of its higher predictability of at-risk students, the regression analysis

was also conducted using earning at least 5.5 credits in grade 9 as the predictor since 5.5 credits is what is currently used in our on-track indicator. The results show that earning 5.5 credits in grade 9 is also a statistically significant predictor ($p=0.005$), but earning at least 5 credits in grade 9 is a stronger predictor ($p=0.000$).

Table 30: Regression Results

Variables	Significance	Statistically Significant
Receiving less than 2 semester Fs in core classes in grade 9*	0.000	Significant at .01 level
Earning at least 5.5 credits in grade 9*	0.005	Significant at .01 level
Attending school 80 percent of the time in grade 9*	0.008	Significant at .01 level
Passing Algebra I in 8th grade or Earlier*	0.009	Significant at .01 level
Students' GPA in grade 9**	0.049	Significant at .05 level
Receiving a waiver in athletics	0.067	No
Suspensions in grade 9	0.077	No
Course repeats in math in grade 9	0.094	No
Took performance arts courses	0.270	No
Took career tech courses	0.283	No
Retained in grade 8	0.318	No
Students with school changes in grades 9-12	0.328	No
Student with school changes in grade 9	0.395	No

* Significant at the .01 level

** Significant at the .05 level

Next, we conducted in-depth analysis to answer two research questions:

- There are four predictors significant at the .01 level. If ASD has to create an on-track indicator, how many of these four predictors should be included?
- Is the on-track indicator currently used by ASD a strong predictor for graduation outcome?

All the following analyses are done with earning 5 credits in grade 9 as the predictor because of its higher predictability power.

The top two predictors are basically the same as the on-track indicator used by the Chicago Public Schools. If we use these two predictors--receiving less than two semester Fs in core courses in grade 9 and earning at least 5 credits in grade 9 in the prediction, the results show that 92.9 percent of the students meeting these two criterion graduate in four years, and only 25.8 percent of the students not meeting these two criterion graduate in four years.

Table 31: Using the Top Two Predictors to Predict High School Outcomes

		Outcome	
		Dropouts	Graduates
Two Predictors	Students not On-Track	74.2%	25.8%
	Students On-track	7.1%	92.9%

When we include the top three predictors—receiving less than two semester Fs in core courses in grade 9, earning at least 5 credits in grade 9, and attending school at least 80 percent of the time in grade 9 in the prediction, table 32 shows that 93.6 percent of the students meeting these three criterion graduate in four years, and only 29.2 percent of the students not meeting these three criterion graduate in four years.

Table 32: Using the Top Three Predictors to Predict High School Outcomes

		Outcome	
		Dropouts	Graduates
Three Predictors	Students not On-Track	70.8%	29.2%
	Students On-track	6.4%	93.6%

When we include the top four predictors—receiving less than two semester Fs in core courses in grade 9, earning at least 5 credits in grade 9, attending school at least 80 percent of the time in grade 9, and completing Algebra I in grade 8 into the prediction, table 33 shows that 97.3 percent of the student meeting these four criterion graduate in four years, and 71.2 percent of the students not meeting these four criterion graduate in four years. The analysis indicates that the four-predictor model is not a strong on-track indicator because it does not have enough distinguishing power to separate high school outcomes of students on-track and students not on-track. Therefore the recommendation is to use either the two-predictor indicator or the three-predictor indicator.

Table 33: Using the Top Four Predictors to Predict High School Outcomes

		Outcome	
		Dropouts	Graduates
Four Predictors	Students not On-Track	28.8%	71.2%
	Students On-track	2.7%	97.3%

Summary

A dropout study by Celio at the Kent School District proposes that an accurate early warning system to identify at-risk students should have the following four components:

- Use results from other research on graduation and dropping out to guide the selection of variables
- Select a single cohort and track it systematically through the schools within the district
- Map the trajectories of actual students through 6th to 12th grades and beyond
- Identify indicators of risk that are specific to the school district

We believe the dropout study conducted at the ASD follows the guideline of the four-component model. First, this dropout research uses several academic and behavior predictors suggested by studies in Chicago, Philadelphia, Kent, Juneau and other school districts to guide the selection of variables. Second, this study selects a single cohort, 8th graders in 2003-04, and tracks the cohort from 2003-04 to 2007-08. Finally, this study identifies significant indicators of at-risk students that are specific to the ASD. The major difference between the model and our study is that we track the cohort from 8th to 12th grades, while the model used by the Kent School District proposes tracking students from 6th to 12th grades.

Through correlation study and regression analysis, we are able to identify the following predictors statistically significant at the .01 level:

- Receiving less than 2 semester Fs in grade 9
- Receiving at least 5 credits in grade 9
- Receiving at least 5.5 credits in grade 9
- Attending school 80 percent of the time in grade 9
- Passing Algebra I in grade 8 or earlier

Another predictor is found to be statistically significant at the .05 level:

- Students' GPA in grade 9

Reference

Allensworth, E. M. & Easton, J. Q. (2005). *The On-Track Indicator as a Predictor of High School Graduation*. Available online at ccsr.uchicago.edu/publications/p78.pdf

Bridgeland, J. M., Dilulio, J. J., & Morison, K. B. (2006). *The Silent Epidemic: Perspectives of High School Dropouts*. Available online at www.csos.jhu.edu/new/Neild_Balfanz_06.pdf

Celio, M. B. (2009). *Getting to Graduation: Kent School District Cohort Study*. Available at <http://www.kent.k12.wa.us/committee-data/gettograd/highlights/2009-2-12.pdf>

Juneau School District. (2006). *Summary of Juneau School District Dropout Data: School Years 2000-2006*. Unpublished document.

Kennelly, L. & Monrad, M. (2007). *Approaches to Dropout Prevention: Heeding Early Warning Signs with Appropriate Interventions*. Available at http://www.betterhighschools.org/docs/NHSC_ApproachesToDropoutPrevention.pdf

Neild, R. C. & Balfanz, R. (2006). *Unfulfilled Promise: The Dimensions and Characteristics of Philadelphia's Dropout Crisis, 2000–2005*. Available online at www.csos.jhu.edu/new/Neild_Balfanz_06.pdf