In the following report, Hanover Research describes critical academic indicators at the elementary, middle, and high school levels. The first half of the report reviews recently published studies that have examined a range of indicators of high school graduation and postsecondary success. The second half describes two approaches to the development of a comprehensive academic indicator system.
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EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

This report describes critical academic indicators at the elementary, middle, and high school levels. Over the last decade, a sizeable body of research has examined the relationship between student outcomes and a range of indicators, including grades, test scores, attendance, and behavior. To the extent possible, this report considers the strength of these indicators for specific grade levels and student populations.

This report proceeds in two sections:

- **Section I: Critical Academic Indicators** examines a range of indicators associated with high school graduation rates and postsecondary success.
- **Section II: Case Profiles** describes two approaches to the development of a comprehensive academic indicator system.

KEY FINDINGS

- **Researchers have identified a broad range of academic indicators at the middle and high school levels and relatively few indicators at the elementary school level.** Studies consistently have found grades, attendance, and exposure to college-level coursework to be meaningful indicators of future success for students in middle and high school. While a smaller body of research examines indicators at the elementary school level, available evidence suggests that reading proficiency and attendance in the early grades may have a lasting impact on student outcomes.

- **Use of multiple indicators is likely to improve the validity of a community-based accountability system.** Districts have access to a range of indicators with varying degrees of predictive power and may develop a more accurate indicator system by considering direct indicators of student outcomes, such as course grades and assessment scores, as well as factors that indirectly affect student learning, such as attendance and behavior. Weaker indicators, such as standardized test scores, may be more useful in conjunction with stronger indicators, such as course grades or rigor.

- **The strength of specific academic indicators varies substantially from district to district.** Studies examining academic indicators have found the predictive power of specific indicators to be inconsistent across districts and student populations.
SECTION I: CRITICAL ACADEMIC INDICATORS

OVERVIEW AND METHODOLOGY

The American Institutes for Research (AIR) recently published a comprehensive literature review examining indicators, predictors, and other potential factors associated with high school graduation and postsecondary success. This report relies on the AIR publication as a foundation for examining the body of research on this topic in greater depth. The following subsections present specific findings from select studies included in the literature review.

Figure 1.1 lists the indicators, predictors, and other factors that the AIR report identified as meaningful variables associated with student outcomes. Please note that some of the factors included in Figure 1.1 are not explicitly discussed in the body of this report, typically because the underlying literature was considered too dated for inclusion in this report, which focuses on studies published in the last 10 years and cohorts graduating in the last 15 years. Nevertheless, the variables listed in Figure 1.1 provide a general sense of the range of factors that have been validated as indicators of high school graduation and postsecondary success.

This report separately discusses academic indicators that pertain to students in elementary, middle, and high school, although considerable overlap exists in the indicators relevant to each level. For example, reading skills, attendance rates, course grades, course rigor, standardized test performance, and behavior serve as valid indicators of future success for multiple school levels. Several studies in this report focus on indicators that may be measured in grades 3, 6, and 9, which may result from school structures as well as developmental milestones. For instance, studies that consider indicators for grade 6 or grade 9 capture differences at the crucial transition periods from elementary to middle school or from middle school to high school.  Grade 3 is a natural choice for researchers examining elementary-level indicators because federal law requires that state assessments be administered beginning in grade 3. More important to the use of the grade 3 benchmark, however, is evidence that a student in grade 4 who reads at a first or second grade level “understands less than one-third to one-half of his or her printed curriculum,” thus elevating the relative importance of reading skills as students progress past grade 3.

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 discourses/transition Elem2Mid.pdf


**Figure 1.1: Variables Affecting High School Completion and Postsecondary Achievement by School Level**

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>INDICATORS, PREDICTORS, AND OTHER FACTORS</th>
</tr>
</thead>
</table>
| **Elementary School** | • Reading by the third grade  
                           • Absenteeism  
                           • Teacher ratings of attention span and classroom participation  
                           • Social skills  
                           • Social competence |
| **Middle School**  | • Absenteeism  
                           • Remaining at the same school  
                           • Behavior grades in grade 6  
                           • Passing ELA and mathematics courses and meeting benchmarks on state exams  
                           • Passing Algebra I in grade 8  
                           • NAEP mathematics scores in grade 8  
                           • Benchmarks on college preparatory exams  
                           • Rigorous coursework  
                           • Grit  
                           • Social-emotional and decision-making skills |
| **High School**   | • Absenteeism  
                           • No more than one failure of ninth-grade subjects  
                           • Mathematics course sequence  
                           • GPA over 3.0  
                           • Passing scores on AP and IB exams  
                           • Dual enrollment  
                           • Passing state exams  
                           • FAFSA completion  
                           • Benchmarks on national assessments  
                           • Benchmarks on college preparatory exams  
                           • Participation in college readiness programs  
                           • Few school transfers  
                           • Early Assessment Program (EAP) and PSAT completion  
                           • Participation in intervention  
                           • Meeting with academic advisor  
                           • Career readiness assessments and certifications |

Source: AIR⁴

**Elementary School Indicators**

The recently-published AIR literature review identified comparatively few robust academic indicators for the elementary school level. Furthermore, AIR did not discover any research that identified elementary-level indicators directly related to postsecondary outcomes; to date, researchers appear to have had more success identifying indicators of “proximal, future academic success” than identifying clear, direct indicators of postsecondary success on the elementary school level.⁵ Thus, this subsection describes findings from studies that examined the relationship between these proximal indicators of future academic success and elementary-level reading proficiency, social skills, and attendance.

In 2012, the Annie E. Casey Foundation (AECF) published research examining the relationship between grade 3 reading proficiency and high school graduation rates using a sample of 3,975 students born in the 10-year period from 1979 to 1989. The study tracked

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⁴ “Predictors of Postsecondary Success.” American Institutes for Research, November 2013, pp. 5-9.  
http://www.ccrscenter.org/sites/default/files/CCRS%20Center_Predictors%20of%20Postsecondary%20Success_final_0.pdf  
⁵ Ibid., p. 4.
student reading progress every two years using the Peabody Individual Achievement Test (PIAT) reading recognition subtest. Among students in the sample, 12 percent failed to graduate by age 19, a benchmark commonly used to estimate dropout rates. The study found substantial differences in graduation rates between students identified as proficient readers in grade 3 and students not identified as proficient readers: only four percent of students who were proficient readers in grade 3 failed to graduate by age 19 as compared with 16 percent of students who were not proficient readers in grade 3. Furthermore, among students who did not graduate by age 19, 88 percent had not achieved reading proficiency by grade 3 (Figure 1.2).

This research demonstrates the relative predictive power of grade 3 reading proficiency for identifying students at risk of not graduating; although most students who were not identified as proficient readers by grade 3 went on to recover and graduate within five years of entering high school, the 12 percentage point disparity in graduation rates for proficient and not proficient readers demonstrates a clear opportunity for intervention targeted at this grade level.

Figure 1.2: Grade 3 Reading Proficiency and High School Graduation

<table>
<thead>
<tr>
<th>Students Not Graduating by Age 19 by Grade 3 Reading Proficiency</th>
<th>Grade 3 Reading Proficiency of Students Who Did Not Graduate by Age 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Proficient in grade 3</td>
</tr>
<tr>
<td>12%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Source: AECF

---


7 Ibid., p. 6.

8 Ibid., p. 7.

9 Ibid., pp. 6-7.
While literacy skills may have a direct effect on learning and knowledge acquisition, some evidence suggests that literacy in the early grades may impact learning in indirect ways. A 2006 study that examined the relationship between social skills and literacy found that poor literacy skills in grades 1 and 3 “predicted relatively high aggressive behavior in the third and fifth grades, respectively.” While the study did not examine effects in the long term, the study’s authors considered the possibility that struggling readers “may become frustrated or unhappy in school and express their frustration and unhappiness by acting aggressively toward the teacher or classmates” and that “time spent acting out or being disciplined for aggressive behavior could reduce the amount of time children are engaged in meaningful learning activities.”

Finally, a 2008 study published by the National Center for Children in Poverty (NCCP) examined the relationship between attendance and academic performance using a national sample of 21,260 students in kindergarten through grade 5. The study found that chronic absenteeism in kindergarten was associated with lower academic achievement in reading, mathematics, and general knowledge, as measured through the Early Childhood Longitudinal Study (ECLS). Although the final report presented only a portion of the data examined in the study, this evidence suggests that the impact of absenteeism is most pronounced among students missing more than 10 percent of school days in the academic year. Figure 1.3 shows that students who missed 10 percent or more of the school year in kindergarten scored approximately four points lower on the academic achievement measures in grade 1 than students who missed 0-3.3 percent of the school year. Some evidence also suggests that absenteeism in kindergarten may be associated with lower academic performance through grade 5. As shown in Figure 1.4, the NCCP study found that, among poor children, students who missed 10 percent or more of the school year in kindergarten scored approximately 3 points lower in mathematics and six points lower in reading in grade 5 than students who missed 0-3.3 percent of the school year.

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11 Ibid., p. 104.

Figure 1.3: Impact of Absenteeism in Kindergarten on Academic Performance in Grade 1

![Bar chart showing the impact of absenteeism in kindergarten on academic performance in Grade 1.]

Source: NCCP\textsuperscript{13}

Figure 1.4: Impact of Absenteeism in Kindergarten on Academic Performance in Grade 5 among Poor Children

![Bar chart showing the impact of absenteeism in kindergarten on academic performance in Grade 5 among poor children.]

Source: NCCP\textsuperscript{14}

\textsuperscript{13} Ibid., p. 8.
\textsuperscript{14} Ibid.
**Middle School Indicators**

In recent years, a substantial body of research has noted critical academic indicators on the middle school level. This subsection summarizes recent research that has examined the relationship between academic outcomes and a range of variables, including grades, attendance, behavior, and grit.

Multiple studies have identified a range of factors that serve as valid indicators of academic success for middle school students. A 2007 study examined the relationship between *middle school disengagement* and high school graduation rates for a sample of approximately 13,000 Philadelphia students tracked over an eight-year period beginning in middle school. Researchers examined a range of potential indicators, including grade 5 test scores, grades in core English and mathematics courses, behavior grades awarded by teachers, suspensions, attendance rates, and student demographics. Ultimately, the study identified five “flags” or early warning signs with strong predictive power in grade 6: attendance rates below 80 percent, failure of a core English or mathematics course, out of school suspension, and behavior grades.\(^\text{15}\) Figure 1.5 describes the predictive power of each of these five indicators.

Overall, the study found “course failure was a better predictor of not graduating than were low test scores.”\(^\text{16}\) Taken together, researchers found that these five flags could be used to identify 60 percent of sixth graders who would not graduate within one year of the on-time graduation benchmark. Furthermore, students with at least one flag in grade 6 had only a 29 percent five-year graduation rate.\(^\text{17}\)

![Figure 1.5: Predictive Power of Grade 6 Indicators](image)

<table>
<thead>
<tr>
<th>FLAG IN GRADE 6</th>
<th>Attendance ≤ 80%</th>
<th>Failed Mathematics</th>
<th>Failed English</th>
<th>Out of School Suspension</th>
<th>Unsatisfactory Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive power: percent of students with each flag by graduation status</td>
<td>13%</td>
<td>13%</td>
<td>12%</td>
<td>16%</td>
<td>24%</td>
</tr>
<tr>
<td>Graduated on time</td>
<td>4%</td>
<td>6%</td>
<td>6%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Did not graduate within one year of on-time graduation</td>
<td>83%</td>
<td>81%</td>
<td>82%</td>
<td>80%</td>
<td>71%</td>
</tr>
<tr>
<td>Yield: percent of non-graduates flagged</td>
<td>23%</td>
<td>21%</td>
<td>17%</td>
<td>10%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: *Educational Psychologist*\(^\text{18}\)

In 2009, the National Middle School Association (NMSA) published additional findings from the researchers responsible for the initial Philadelphia study discussed above. In replicating

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\(^\text{16}\) Ibid., p. 227.

\(^\text{17}\) Ibid.

\(^\text{18}\) Ibid., p. 228.
the Philadelphia study in five additional school districts, researchers found similar results (described in Figure 1.6). Overall, the five-district study found grades, absenteeism, and course failures to be consistent indicators of high school graduation rates. Standardized tests, however, were found to have the greatest predictive power for students scoring in the lowest percentile. Notably, the study also found that the threshold at which absenteeism served as a useful indicator or early warning signal varied across districts.19

Figure 1.6: Findings of Middle School Indicators across Five Districts

- **Critical attendance thresholds varied by school district.** In some districts, students who missed a month or more of school (roughly, 90% attendance rates or less) had greatly diminished graduation odds. In other districts, students needed to miss two or more months (roughly, attendance of 80% or less) to achieve similar outcomes.

- **Mild but sustained misbehavior appears to have an independent effect on graduation odds.** In other words, not paying attention in class, acting out, and not getting along with teachers in sustained fashion signal disengagement.

- **Students who fall off track in the sixth grade tend to have one or two off-track indicators.** Relatively few sixth graders have three or four indicators, that is, failing math and English and having low attendance and poor behavior (a pattern, by comparison, that is common in high school). This suggests that students, at least in the sixth grade, are falling off the graduation path from different avenues.

- **The earlier students develop off-track indicators, the lower their graduation odds appear to be.** The first year of the middle grades, much like ninth grade, appears to be a make-or-break year. Across the school districts we examined, most middle grades students developed their off-track indicators in sixth grade. Moreover, these students had worse outcomes than students who did not begin to develop off-track indicators until at least the seventh grade.

- **Students who exhibit off-track indicators in the middle grades are resilient.** Sixth graders who signaled they were falling off the graduation path typically remained in school for at least five more years. This indicates there is time to intervene and that, despite years of struggle, students, perhaps with diminishing motivation, continue to attempt to participate and succeed in their schooling.

- **Different measures of academic outcomes are often highly correlated, but some are still better indicators than others.** Across the districts, we found that course grades were better indicators; they were both more reliable and had a higher yield (predicted a greater percentage of dropouts) than standardized test scores. Only very low test scores—scores below the 15th percentile on a nationally normed test—had predictive power and useful yields.

- **Ds seem important, too.** Across the districts we found course failure—typically defined as receiving an F or a grade below 60% or 65%—was more predictive than receiving the grade just above failing, typically a D. Students who received Ds, however, still had considerably lower graduation odds than students with C averages or higher.

- **Students who come every day, behave, and get good grades graduate in high numbers.** Across the districts we examined, middle grades students who had 95% or better attendance, B averages or better, and no record of misbehavior graduated in relatively large numbers, even when they attended low-performing schools in high-poverty districts.

Source: National Middle School Association

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20 Adapted nearly verbatim from: Ibid.
Similarly, a 2008 study examined the relationship between **middle school achievement** and high school success by following a cohort of grade 7 students enrolled in three California school districts—Fresno, Long Beach, and San Francisco. Figure 1.7 describes the strength of the relationships between middle school indicators (including grades and test scores) and high school achievement (including graduation and grade 11 GPA). All estimates presented in Figure 1.7 have been adjusted to account for demographic factors, including English language learner status, special education enrollment, socioeconomic status, race/ethnicity, gender, and grade level retention.21

The parameter estimates presented in Figure 1.7 suggest that student GPA in grade 7 “is consistently a significant predictor of high school completion.”22 While scores on ELA and mathematics assessments in grade 8 were found to be related to high school achievement, the statistical significance of these measures was somewhat inconsistent across districts. Enrollment in Algebra I in grade 8 and course failures in grade 7 were also inconsistently found to be statistically significant predictors of high school success. Course failures in grade 8, however, were consistently found to have a negative impact on high school achievement.23

**Figure 1.7: Parameter Estimates from Regression Models Predicting High School Achievement**24

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>FRESNO</th>
<th>LONG BEACH</th>
<th>SAN FRANCISCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High School Graduation</td>
<td>Grade 11 GPA</td>
<td>High School Graduation</td>
</tr>
<tr>
<td>Grade 7 GPA</td>
<td>0.7771***</td>
<td>0.4291***</td>
<td>0.6336***</td>
</tr>
<tr>
<td>Algebra enrollment in grade 8</td>
<td>0.6959**</td>
<td>-0.0303</td>
<td>-0.0120</td>
</tr>
<tr>
<td>Grade 8 ELA test scores</td>
<td>0.0073***</td>
<td>0.0024***</td>
<td>0.0054***</td>
</tr>
<tr>
<td>Grade 8 mathematics test scores</td>
<td>0.0025*</td>
<td>0.0026***</td>
<td>0.0055***</td>
</tr>
<tr>
<td>2 or more F's in grade 7</td>
<td>0.1462</td>
<td>0.2130***</td>
<td>-0.2221**</td>
</tr>
<tr>
<td>2 or more F's in grade 8</td>
<td>-0.9066***</td>
<td>-0.1556***</td>
<td>-0.4739***</td>
</tr>
</tbody>
</table>

Note: Asterisks denote statistical significance.25
Source: University of California at Santa Barbara26

A similar 2008 study examined academic progress of a cohort of 48,561 students enrolled in the Los Angeles Unified School District as they progressed from grade 6 through 12. Relying on data collected through the district’s longitudinal student information system, the study “identifies key times and circumstances, beginning in middle school, that relate to

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22 Ibid.
23 Ibid., pp. 32-34.
24 Parameter estimates describe the incremental impact of an indicator on an outcome for a given regression model. While the numbers presented in Figure 1.7 are of limited interpretive value, as they do not represent correlations or predictive power per se, they demonstrate the varying strength of individual indicators from district to district.
25 ***p<0.001; **p<0.01; *p<0.05
successful and unsuccessful schooling trajectories.” 27 Figure 1.8 describes on-time graduation rates of study participants based on middle school course failures and assessment scores. Students who failed two or more classes in middle school had a 29-percentage point lower on-time graduation rate than students who did not fail any classes in middle school. Additional evidence suggested that the grade in which a student failed a course also impacted outcomes: students who failed a course in grade 8 were less likely to recover academically than students who failed a course in grade 6 or 7.28

Results from standardized tests administered in grades 6 through 8 were found to be particularly meaningful indicators of future success:

At every level, at least as early as grade 6, test scores are predictive of graduation – and the relationship is persistent over time. Fewer than half of students scoring below the 50th percentile will graduate, whether we are talking about 6th-grade, 7th-grade, s, or 8th-grade scores, and whether we are talking about performance in math or language arts. On the other hand, nearly three quarters of students with higher scores will go on to graduate.29

**Figure 1.8: Middle School Indicators of On-Time Graduation**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>ON-TIME GRADUATION RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No F’s in middle school</td>
<td>69%</td>
</tr>
<tr>
<td>Two or more F’s in middle school</td>
<td>40%</td>
</tr>
<tr>
<td>Basic or higher assessment score</td>
<td>71%</td>
</tr>
</tbody>
</table>

*On-time graduation, all students: 48%

Source: University of California at Santa Barbara 30

Finally, some promising research has identified personal characteristics that may serve as meaningful indicators of future success. In 2009, researchers at the University of Pennsylvania examined a series of studies that described the relationship between academic achievement and performance on the Grit Scale, which assesses “trait-level perseverance and passion for long-term goals.”31 One study examined the role of grit in academic achievement of 279 adolescents in grades 7, 8, 10, and 11 enrolled in a magnet school. After controlling for age, the study found a statistically significant positive correlation between grit and GPA and a statistically significant negative correlation between grit and time spent watching television.32 Figure 1.9 presents correlations between grit and each variable for the two-year study period.

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28 Ibid., p. 13.

29 Ibid., p. 16.


32 Ibid., p. 170.
Figure 1.9: Correlation between Grit and Factors Associated with Future Outcomes

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>0.30</td>
<td>0.32</td>
</tr>
<tr>
<td>Hours watching television</td>
<td>-0.24</td>
<td>-0.22</td>
</tr>
</tbody>
</table>

Source: Journal of Personality Assessment

HIGH SCHOOL INDICATORS

This final subsection describes academic indicators on the high school level, which include course grades, standardized test scores, and exposure to college-level coursework.

In 2007, the Consortium on Chicago School Research (CCSR) at the University of Chicago examined the relationship between achievement and course grades, course failures, and attendance in grade 9. The study, which examined the progression of 24,894 first-time grade 9 students enrolled in Chicago Public Schools, identified multiple indicators that would permit district educators to identify students at risk of not graduating as early as the midpoint in the freshman year. Figure 1.10 describes the overall correct prediction rate for each indicator as well as a measure of each indicator’s specificity (i.e., correct prediction of non-graduates) and sensitivity (i.e., correct prediction of graduates). Overall, freshman year GPA and on-track status, which refers to the successful completion of credits required to progress to the next grade, were found to have the greatest predictive power for identifying non-graduates.

Figure 1.10: Specificity and Sensitivity of Grade 9 Performance Indicators

<table>
<thead>
<tr>
<th>GRADE 9 PERFORMANCE INDICATOR</th>
<th>OVERALL CORRECT PREDICTION</th>
<th>SPECIFICITY (PREDICTING NON-GRADUATES)</th>
<th>SENSITIVITY (PREDICTING GRADUATES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>80%</td>
<td>73%</td>
<td>85%</td>
</tr>
<tr>
<td>On-track status</td>
<td>80%</td>
<td>72%</td>
<td>85%</td>
</tr>
<tr>
<td>Course failures</td>
<td>80%</td>
<td>66%</td>
<td>89%</td>
</tr>
<tr>
<td>Fall semester failures</td>
<td>76%</td>
<td>55%</td>
<td>91%</td>
</tr>
<tr>
<td>Absences</td>
<td>77%</td>
<td>59%</td>
<td>90%</td>
</tr>
<tr>
<td>Fall semester absences</td>
<td>74%</td>
<td>53%</td>
<td>89%</td>
</tr>
</tbody>
</table>

Source: CCSR

In 2012, the Center for Public Education (CPE) published a study examining performance indicators for a nationally representative sample of a cohort of 9,060 students. The study uncovered a meaningful relationship between course rigor and persistence in college. The research showed that, regardless of prior academic achievement or socioeconomic background, “the higher the math course a student takes in high school, the greater the

33 Ibid.
36 Ibid.
probability that a student will persist.”37 The study also found that higher ACT and SAT mathematics scores also were associated with college persistence, with high-income students scoring a 28 on the ACT mathematics section (or the equivalent on the SAT) showing a 9 percent greater persistence rate over students scoring an 18 on the ACT mathematics section (or the equivalent on the SAT). This finding was more pronounced among middle-income students, who showed a 12 percent greater likelihood of persisting, and low-income students, who showed a 15 percent greater likelihood of persisting, on meeting these same benchmarks.38 Furthermore, though the CPE study also found greater persistence rates among students who completed AP or IB courses, the study’s authors also acknowledged the difficulty of distinguishing between the impact of AP coursework and “the abilities of students motivated enough to take them.”39

Other studies similarly have found value in the use of course rigor and standardized test scores as academic indicators. In 2007, the Virginia Department of Education initiated a multi-year study to identify “indicators of preparation for college that are independently associated with a high probability of enrollment and persistence in four-year postsecondary institutions.”40 The study included a review of the records of 86,312 high school graduates and non-graduate completers (students earning GEDs or certificates of completion) from the 2007-2008 school year.41 Indicators associated with postsecondary success included:

- Participating in a college preparatory course curriculum that includes Algebra II and chemistry.
- Earning advanced proficient scores on Virginia’s statewide end-of-course assessments (Standards of Learning (SOL) assessments) in mathematics, reading, and writing.
- Earning an Advanced Studies diploma.
- Participating in the Virginia Early College Scholars program.
- Participation in Advanced Placement, International Baccalaureate, and dual enrollment courses.
- Earning college ready scores on tests such as the SAT and ACT.42

Additional evidence suggests that college-level work, particularly through dual enrollment, may have a substantial positive impact on postsecondary outcomes. A 2007 study examined the impact of dual enrollment on college enrollment after high school and college GPA among students in Florida and New York. The Florida study included a sample of 299,685

38 Ibid., p. 7.
39 Ibid., p. 8.
41 Ibid., p. 2.
42 Ibid., p. 1.
public school students, and the New York study included a sample of 2,303 students who attended a vocational high school and enrolled in the City University of New York (CUNY) after graduating. As shown in Figure 1.11 and Figure 1.12, each study identified meaningful differences in postsecondary outcomes for students who participated in dual enrollment while in high school, including differences in persistence and GPA. These differences were somewhat less pronounced in the more restricted New York sample, however, which demonstrates that the strength of an indicator may vary by the student population.

**Figure 1.11: Postsecondary Outcomes by Dual Enrollment Participation, Florida**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>NON-DUAL ENROLLMENT STUDENTS</th>
<th>DUAL ENROLLMENT STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>College enrollment after high school</td>
<td>50.06%</td>
<td>80.88%</td>
</tr>
<tr>
<td>Persistence to second year</td>
<td>70.48%</td>
<td>82.81%</td>
</tr>
<tr>
<td>1st year GPA</td>
<td>2.40</td>
<td>2.96</td>
</tr>
<tr>
<td>2nd year GPA</td>
<td>2.36</td>
<td>2.92</td>
</tr>
<tr>
<td>Total GPA over three years</td>
<td>2.35</td>
<td>2.91</td>
</tr>
</tbody>
</table>

Source: National Research Center for Career and Technical Education

**Figure 1.12: Postsecondary Outcomes by Dual Enrollment Participation, New York**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>NON-DUAL ENROLLMENT STUDENTS</th>
<th>DUAL ENROLLMENT STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st term GPA</td>
<td>2.28</td>
<td>2.53</td>
</tr>
<tr>
<td>4th term GPA</td>
<td>2.16</td>
<td>2.37</td>
</tr>
<tr>
<td>Persistence to second year</td>
<td>60.64%</td>
<td>69.77%</td>
</tr>
</tbody>
</table>

Source: National Research Center for Career and Technical Education

**On-track status**, which provides “a baseline indicator of acceptable, though not necessarily strong, school performance,” also has been found to be strongly associated with graduation rates. As shown in Figure 1.13, a 2005 study of Chicago Public Schools found that students who were on track at the end of grade 9 were more than 3.5 times more likely to graduate from high school on time than their off-track peers.

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44 Ibid., pp. 27, 45.
45 Ibid., p. 27
46 Ibid., p. 45
48 Ibid., p. 7.
Studies examining the power of the SAT and ACT as indicators of college readiness have obtained somewhat mixed results. Research conducted or sponsored by ACT, Inc. and by the College Board, which publishes the SAT, each have found their respective assessments to be strong, statistically significant predictors of postsecondary success. Ultimately, however, both ACT, Inc. and the College Board recommend that college entrance assessments be considered in conjunction with other important indicators, such as high school grades and rigor of high school courses.

Some external studies have identified weaknesses in the use of the SAT and ACT as indicators of postsecondary success. For instance, a 2014 study of 33 colleges with optional standardized testing policies reviewed approximately 123,000 student and alumni records and observed “no significant differences in either cumulative GPA or graduation rates between submitters and non-submitters.” The study also noted that college GPAs tended

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49 Ibid., p. 8.
to “track” with high school GPAs. A 2012 study found that the predictive validity of the SAT varied by student demographics as well as by institution:

Institutional characteristics moderated the size of SAT validities, such that more selective schools and schools that emphasize traditional assessment techniques (i.e., school records, standardized tests) showed higher SAT validities while schools that were larger and where students demonstrated more financial need, schools that emphasized the usage of alternative assessment techniques (i.e., essays, letters of recommendations, extracurricular activities), and schools that enrolled higher percentages of historically disadvantaged minority students generally exhibited lower SAT validities.

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53 Ibid.
SECTION II: CASE PROFILES

This section describes two approaches to the development of a comprehensive academic indicator system. First, this section describes the College Readiness Indicator System (CRIS), which developed from a national, multi-year pilot program and currently exists as a resource to support districts in independently determining and using critical academic indicators to evaluate district outcomes and make effective use of this data. Second, this section describes the Road Map Project, an initiative sponsored by a community-based organization that has conducted a rigorous review process to select appropriate indicators of academic success for districts served by the program.

Note that this section does not profile any single district that has developed a successful academic indicator system. A substantial number of studies examined for this report have concluded that the strength and relevance of an academic indicator may vary from district to district, and, thus, Hanover Research concluded that a review of any single indicator system may be of limited value in this context. Many experts in the development of academic indicator systems, including the CRIS network and leaders of the Road Map Project, have suggested that indicators are best developed on the local level and on the basis of local data. Thus, while each section of this report provides some evidence of the relative strength of indicators at each school level, this report cannot identify which indicators would best meet any given district’s needs or what precise benchmarks would be most appropriate for a district. On request, Hanover Research may conduct additional quantitative research examining data specific to individual districts to determine the predictive power of key indicators for a district.

COLLEGE READINESS INDICATOR SYSTEM NETWORK

The College Readiness Indicator System (CRIS) network is a partnership between the Brown University Annenberg Institute for School Reform (AISR) and the Stanford University John W. Gardner Center (JGC) formed to “develop, test, and disseminate effective tools and resources that provide early diagnostic indications of what students need to become college ready.” From 2011 to 2013, five districts nationwide participated in the pilot program, including Dallas Independent School District, New Visions for Public Schools (located in New York City), the School District of Philadelphia, Pittsburgh Public Schools, and San Jose Unified School District.

57 Ibid.
In May 2014, CRIS published a six-part resource series that describes the process of building a college readiness indicator system. As shown in Figure 2.1, districts employing the CRIS framework select indicators at three levels—“individual (student), setting (school), and system (district)” —and in three college readiness dimensions—“academic preparedness, academic tenacity, and college knowledge.”

**Figure 2.1: Indicator Levels and Dimensions**

<table>
<thead>
<tr>
<th>INDICATOR LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the <strong>individual level</strong>, indicators measure students’ personal progress toward college readiness. In addition to courses and credits, individual-level indicators include knowledge about college requirements and students’ goals for learning.</td>
</tr>
<tr>
<td>At the <strong>setting level</strong>, indicators track the resources and opportunities for students provided by their school. These include teachers’ efforts to push students to high levels of academic performance, a high school’s college-going culture, and the availability of Advanced Placement courses at a school.</td>
</tr>
<tr>
<td>At the <strong>system level</strong>, the focus of the indicators is on district policy and funding infrastructure that affect the availability of college readiness supports, including guidance counselors, professional development for teachers, and resources to support effective data generation and use. System-level indicators signal the extent to which district-level resources are in place to carry out an effective college readiness agenda.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INDICATOR DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic preparedness</strong> refers to key academic content knowledge and cognitive strategies needed to succeed in doing college-level work. Examples of indicators of academic preparedness are student GPA and the availability of Advanced Placement courses at a school.</td>
</tr>
<tr>
<td><strong>Academic tenacity</strong> refers to the underlying beliefs and attitudes that drive student achievement. Attendance and disciplinary infractions are often used as proxies for academic tenacity; other indicators include student self-discipline and the extent to which teachers press students for effort and rigor.</td>
</tr>
<tr>
<td><strong>College knowledge</strong> is the knowledge base and contextual skills that enable students to successfully access and navigate college. Examples of college knowledge indicators are students’ knowledge of the financial requirements for college and high schools’ promotion of a college-going culture.</td>
</tr>
</tbody>
</table>

Source: CRIS

Districts implementing the CRIS framework may select from a “menu” of college readiness indicators for each level and dimension (Figure 2.2). While each indicator may serve as a valid measure of college readiness, not all indicators are appropriate for every district. District leaders are encouraged to consider a range of factors in selecting appropriate

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59 Ibid.
indicators, such as the relevance of a factor to the district’s mission and priorities, “political challenges” associated with individual indicators, and the “capacity to collect and understand” the data associated with a specific indicator. In navigating these concerns, district leaders are encouraged to select indicators that are:

- **Valid for the intended purpose**: Effective indicators are valid for the intended purpose, based on research evidence and, if possible, careful analysis of a district’s own data.
- **Actionable by schools**: Indicators are actionable by schools when they provide guidance as to which students to target for intervention or which areas of college readiness to focus their efforts on.
- **Meaningful and easily understood by practitioners**: Indicators that are overly complex or do not provide information that is pertinent to school practitioners are unlikely to improve the outcomes they are intended to address.
- **Aligned with the priorities of districts and schools**: Indicators become effective when the district leadership prioritizes the indicators and related initiatives among their other goals and provides support and resources that help people understand how to use the indicators and integrate them into their practice on an ongoing basis.

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**Figure 2.2: Menu of College Readiness Indicators by Level and Dimension**

<table>
<thead>
<tr>
<th>INDICATOR LEVEL</th>
<th>ACADEMIC PREPAREDNESS</th>
<th>ACADEMIC TENACITY</th>
<th>COLLEGE KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>• GPA</td>
<td>• Attendance</td>
<td>• Knowledge of admission criteria, application process, and financial requirements for college</td>
</tr>
<tr>
<td></td>
<td>• No failures in core subjects</td>
<td>• Disciplinary infractions</td>
<td>• Completion and submission of application to colleges that constitute a good match</td>
</tr>
<tr>
<td></td>
<td>• Completion of X-level math and science courses</td>
<td>• Mastery orientation</td>
<td>• Meeting with college adviser and/or having post-graduation plan</td>
</tr>
<tr>
<td></td>
<td>• Maintaining level of achievement in transition years</td>
<td>• Self-discipline</td>
<td>• Independent study skills</td>
</tr>
<tr>
<td></td>
<td>• Performance on high school exit and benchmark exams</td>
<td></td>
<td>• SAT/ACT participation</td>
</tr>
<tr>
<td></td>
<td>• Participation in college-level coursework/college-prep curriculum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SAT/ACT score</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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61 Ibid., p. 7.
<table>
<thead>
<tr>
<th>INDICATOR LEVEL</th>
<th>ACADEMIC PREPAREDNESS</th>
<th>ACADEMIC TENACITY</th>
<th>COLLEGE KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>• Trends in individual-level indicators of academic preparedness</td>
<td>• Trends in individual-level indicators of academic tenacity</td>
<td>• Trends in individual-level indicators of college readiness</td>
</tr>
<tr>
<td></td>
<td>• Teacher effectiveness/quality</td>
<td>• Consistent attendance policy</td>
<td>• High school college-going climate</td>
</tr>
<tr>
<td></td>
<td>• Dropout rates (or high school completion rates)</td>
<td>• Consistent disciplinary policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Availability of college-level coursework/college-prep curriculum</td>
<td>• Perceived safety of school</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consistent grading policy</td>
<td>• Instructional scaffolding5</td>
<td></td>
</tr>
<tr>
<td>System</td>
<td>• Level of district/state curricular requirements</td>
<td>• Resources allocated to efforts to promote college readiness</td>
<td>• Policies that target the development of early college awareness and the skills to navigate the college and financial aid application process</td>
</tr>
<tr>
<td></td>
<td>• Alignment of high school graduation requirements and college entry requirements</td>
<td>• Monitoring system for schools’ college attendance rates</td>
<td>• Resources allocated to efforts to promote college readiness</td>
</tr>
<tr>
<td></td>
<td>• Resources allocated to efforts to promote college readiness</td>
<td>• Communication between district office and school personnel regarding college readiness</td>
<td>• Monitoring system for schools’ college attendance rates</td>
</tr>
<tr>
<td></td>
<td>• Monitoring system for schools’ college attendance rates</td>
<td></td>
<td>• Communication between district office and school personnel regarding college readiness</td>
</tr>
<tr>
<td></td>
<td>• Communication between district office and school personnel regarding college readiness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: CRIS63

**ROAD MAP PROJECT**

The Washington-based Road Map Project serves seven districts in South King County and South Seattle with the goal of doubling the number of students on track to earn a college degree or career credential by 2020.64 The project is supported by the local Community Center for Education Results (CCER) as well as by a range of community stakeholders, including educators, parents, and local business leaders.65

Indicators for the Road Map Project were selected with support from the Education Results Network and the Data Advisors Group through analysis of similar “cradle-to-college-and career initiatives” as well as characteristics of the top-performing districts in the state.66 At the outset of the project, multiple workgroups formed to nominate potential indicators that eventually were approved by project sponsors. The same workgroups are in the process of

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64 “Road Map Project Goal.” Road Map Project. http://www.roadmapproject.org/the-project/our-goal/
reviewing indicators, and once indicators are finalized for the current data collection period, the Data Advisors Group will assist project leaders in identifying target outcomes.67

The Road Map Project distinguishes between on-track indicators and “contributing indicators,” which “are reported annually or whenever possible, but do not have specific targets.”68 On-track indicators assessed for the project include standard academic and behavioral indicators, such as performance on standardized assessments, absences, and suspensions (Figure 2.3). Contributing indicators, in contrast, include a range of indicators that are somewhat more difficult to measure, including course rigor, parent engagement, and demographic factors (Figure 2.4). The project relies on participating districts as well as local, state, and national agencies as data sources.69

**Figure 2.3: On-Track Indicators**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ON-TRACK INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Ready for Kindergarten</td>
<td>▪ Percent of children ready to succeed in school by kindergarten</td>
</tr>
</tbody>
</table>
| Supported and Successful in School | ▪ Percent of students proficient in:  
  ▪ 3rd grade reading  
  ▪ 4th grade math  
  ▪ 5th grade science  
  ▪ 6th grade reading  
  ▪ 7th grade math  
  ▪ 8th grade science  
  ▪ Percent of 9th graders triggering Early Warning Indicator #1 (six or more absences and one or more course failures)  
  ▪ Percent of 9th graders triggering Early Warning Indicator #2 (one or more suspensions or expulsions) |
| Graduate from High School College and Career-Ready | ▪ Percent of students who graduate high school on time  
  ▪ Percent of graduating high school students meeting minimum requirements to apply to a Washington State 4-year college |
| Earn a College Degree or Credential | ▪ Percent of students who enroll in postsecondary education by age 24  
  ▪ Percent of students continuing past the first year of postsecondary  
  ▪ Percent of students who earn a postsecondary credential by age 24 |

Source: Road Map Project70

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67 Ibid.
### Figure 2.4: Contributing Indicators

<table>
<thead>
<tr>
<th>Category</th>
<th>On-Track Indicators</th>
</tr>
</thead>
</table>
| **Health and Ready for Kindergarten** | • Percent of children born weighing less than 5.5 pounds  
• Percent of eligible children enrolled in select formal early learning programs  
• Percent of licensed child care programs meeting quality criteria  
• Percent of families reading to their children daily  
• Percent of children meeting age-level expectations at the end of preschool  
• Percent of children enrolled in full-day kindergarten                                                                                                                                                                                                                       |
| **Supported and Successful in School** | • Percent of parents who feel knowledgeable and confident in their ability to support their child’s learning within the education system, prekindergarten through college  
• Percent of parents who believe their school provides a welcoming and culturally responsive learning environment  
• Percent of parents who have leadership opportunities and influence on decision-making at their school or district  
• Percent of students:  
  ○ Who are motivated and engaged to succeed in school  
  ○ Exhibiting 21st century skills  
  ○ Absent 20 or more days per year  
  ○ Taking algebra by the 8th grade  
  ○ Taking one or more AP, IB, or Cambridge course(s)  
  ○ Passing the exams required for high school graduation  
  ○ Making a non-promotional school change  
  ○ Attending schools with low State Achievement Index ratings  
• Percent of English language learning students making progress in learning English  
• Percent of 8th graders reporting select risk factors on the Healthy Youth Survey  
• Percent of females age 15-17 giving birth                                                                                                                                                                                                                                    |
| **Graduate from High School College and Career-Ready** | • Percent of students who graduate high school by age 21  
• Percent of high school graduates completing a formal career and technical education program  
• Percent of eligible students who complete the College Bound application by the end of 8th grade  
• Percent of graduating College Bound students who have completed the FAFSA                                                                                                                                                                                                   |
| **Earn a College Degree or Credential** | • Percent of students who directly enroll in postsecondary education  
• Percent of students who did not complete high school on time who achieve a postsecondary credential  
• Percent of students employed within 1 and 5 years of completing or leaving postsecondary education, including wage                                                                                                                                                       |

Source: The Road Map Project71

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71 Adapted nearly verbatim from: Ibid., p. 2.
PROJECT EVALUATION FORM

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