Executive Summary

School Readiness and Student Achievement

A Longitudinal Analysis of Santa Clara and San Mateo County Students

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Background

In late 2000, Applied Survey Research (ASR) was commissioned by the Peninsula Community Foundation to develop research materials and a protocol to conduct assessments of students’ levels of readiness for school. The project resulted in the creation of a new tool to measure school readiness, called the Kindergarten Observation Form (KOF), which balanced and met two (sometimes competing) needs: (1) the need for a high-quality, valid, and reliable instrument to measure readiness levels; and (2) the need for a tool that was simultaneously “teacher-friendly” and sensitive to the measurement challenges inherent in a typical kindergarten classroom setting.

The KOF was first implemented in 2001, and since that initial assessment, enhancements to the school readiness assessment tools and method have continued. In collaboration with the Santa Clara County Partnership for School Readiness, in 2004 ASR developed a parent survey and teacher survey to enrich the data collected about children entering school, and in 2006, the Kindergarten Observation Form II was developed to provide information about the smoothness of children’s transitions into kindergarten.

Analyses of the school readiness assessment data collected with the KOF in different regions and years have consistently found evidence of four primary dimensions of readiness (subsequently named the Basic Building Blocks of readiness), including the following:

- **Self-Care & Motor Skills** include those skills needed for taking care of one’s basic needs or skills showing fine and gross motor coordination;
- **Self-Regulation** skills include basic emotion regulation and self-control skills that are needed to be able to perform well in the classroom;
- **Social Expression** skills include measures related to children’s interactions with others, their ability to express themselves in the classroom context, and their engagement with play and learning; and
- **Kindergarten Academics** skills represent the “nuts and bolts” skills that are more academic in nature and tend to be explicitly taught to children at home, in early care settings, and in kindergarten.

The assessment data have helped communities to better understand what skills children possess, what skills children need greater support in developing, how things are changing over time, and what experiences and practices are associated with greater readiness. In particular, analyses examining predictors of higher readiness levels have repeatedly shown that certain children – e.g., older children, girls, children without special needs – tend to enter school more ready to learn. Other significant predictors have pointed to potential opportunities for enhancing children’s readiness levels, e.g., preschool experience and provision of information to parents about school readiness and how to develop their children’s skills.

A growing body of research at the national level has begun to examine the relationship between children’s readiness for school at kindergarten entry and their later school achievement as well. This work has shown that children’s social and cognitive readiness for school acts as a
“springboard” for later success in school. Locally, the Santa Clara County Partnership for School Readiness sponsored ASR’s first longitudinal study examining longer-term academic outcomes of San Mateo County students who took part in school readiness assessments in 2001-2003. In this study, ASR found that children who entered kindergarten with strengths across all readiness domains were the most successful on academic tests at third grade, and, in particular, *Kindergarten Academics* skills were most closely associated with later academic success.

The Current Study

Since the completion of ASR’s initial longitudinal study, longer-term school outcome data had become available for two additional cohorts of students who participated in school readiness assessments: those who entered kindergarten in fall 2004 (measured in Santa Clara County) and fall 2005 (measured in both Santa Clara and San Mateo counties).

In late 2009, the Santa Clara County Partnership for School Readiness and the Silicon Valley Community Foundation jointly commissioned a second longitudinal study, and plans were initiated to seek cooperation from school districts throughout Santa Clara and San Mateo counties to provide data examining associations between students’ school readiness levels at kindergarten entry and their longer-term school outcomes. These new data would also provide an opportunity to re-examine the predictive validity of the KOF – this time with a more geographically, demographically, and socio-economically diverse student sample than was available in the previous longitudinal study.

Key Research Questions

The purpose of this report is to improve our understanding of whether and how the readiness levels of students entering kindergarten in Santa Clara and San Mateo counties may relate to their later school success. More specifically, the following research questions are addressed in the sections that follow:

- What child, family, and school readiness factors were linked to third grade academic outcomes? Were these associations similar for different kinds of students?
- What academic paths were taken by the most and least ready kindergarteners? For students who took a different path than would be suggested by their readiness levels at kindergarten, how were they different from their peers?
- Were the groups of students who were less ready for school at kindergarten able to close the gap by third grade?
- Were school readiness levels associated with other school outcomes, such as reclassification as fluent in English, school attendance, or retention in kindergarten?
- How did the students in the two counties compare to each other?

Securing and Preparing the Data

The potential sample of students for this longitudinal analysis included participants in readiness assessment studies conducted by ASR in fall 2004 and fall 2005. In 2004, readiness assessments were conducted with kindergarten students in Santa Clara County only, and in 2005, readiness assessments were conducted in both Santa Clara and San Mateo counties. In each of these
readiness assessments, a random sample of schools – and a randomly sampled kindergarten classroom within each school – was drawn from all county elementary schools in order to achieve a student sample that was generalizable to the kindergarten population within each county. In addition to the county-wide sample, each readiness assessment also included some targeted oversampling within key regions of interest – generally lower-performing districts where investments had been made to improve readiness-related outcomes among students.

ASR sought participation in this longitudinal study from the ten districts in each county with the largest number of students in the readiness samples (county-wide and oversamples) described above. Thus, it is important to keep in mind that the longitudinal data are not generalizable to student populations at the county- or region-level.

With assistance from the both the San Mateo and Santa Clara County Offices of Education, ASR sought permission to receive de-identified student records from the selected districts in each county. All but one district complied with the data requests. Student records across the two datasets (school readiness data kept by ASR and elementary school data kept by districts) were matched according to student initials, date of birth, gender, and school of kindergarten attendance. (In some cases ASR did the matching, whereas some districts requested that they complete the matching themselves). Across the two counties, of the subset of 2,373 school readiness assessment participants in the 19 districts, 1,543 were matched to district records, resulting in a match rate of 65 percent overall.

**Figure A: Summary of Data Preparation Steps and Sample Sizes**

- **Readiness data collected on**
  - 2,973 students
  - in Santa Clara County (2004, 2005) and San Mateo County (2005)

- **Decision to follow up with the 10 districts in each county with the most students in readiness sample =**
  - 2,403 possible records for matching
  - (1,566 in SCC, 837 in SMC)

- **Received records from 10 of 10 districts in SCC and 9 of 10 districts in SMC =**
  - 2,373 possible records for matching
  - (1,566 in SCC, 807 in SMC)

- **Matched 1,543 of the 2,373 records =**
  - 65% match rate
Students in the Longitudinal Sample

The longitudinal study sample included students who were demographically and socioeconomically similar to the larger sample of students who participated in readiness assessments in Santa Clara and San Mateo counties in 2004 and 2005. One interesting difference between students in the readiness samples who were able to be matched to district records and those who were not was that the matched sample had higher levels of kindergarten readiness than the original samples. Higher mobility (movement out of the original school district), increased grade retention, or some other factor may have led to a lower match rate for students with lower readiness levels.

Did School Readiness Predict Third Grade Test Scores?

The Kindergarten Academics and Self-Regulation skills that students possessed at the start of kindergarten strongly predicted their performance on English-Language Arts (ELA) and Mathematics California Standards Tests (CSTs) taken 3 ½ years later. Moreover, the interaction of these two types of readiness skills (as indicated by the Kindergarten Academics x Self-Regulation bar in the following figure) was a significant predictor of later test scores. This means that the impact of these two readiness domains is not simply additive – certain combinations of skills are associated with much stronger performance on third grade tests. Follow-up investigations of this interaction showed that students who had a combination of strong skills in both Kindergarten Academics and Self-Regulation were particularly likely to perform well on their third grade tests. Family income and ethnicity also were related to performance on third grade tests.

Figure B: Results of Regression Analysis Predicting Third-Grade Standardized Test Scores in English-Language Arts and Math

Source: Kindergarten Observation Form and Parent Information Form and individual school district data.

Note: Values for each factor listed above represent standardized beta coefficients that were significant at p < .05 and, to establish levels of practical significance as well as statistical significance, greater than or equal to .10. For a full listing of all variables entered into the model, see text. The overall regression model for ELA was highly significant, F = 33.98, p < .001, explaining 35% of the variance in 3rd grade ELA scores (R² = .36; Adj. R² = .35). The overall regression model for Math was highly significant, F = 27.80, p < .001, explaining 30% of the variance in 3rd grade Math scores (R² = .32; Adj. R² = .30).
It is noteworthy that some variables that were strong predictors of children’s readiness at kindergarten entry in previous studies – e.g., gender, special needs status, age and preschool experience – did not have a separate significant association with third grade tests scores. This suggests that, if these variables have an impact on third grade scores, the impact is either indirect (they may affect the readiness of students, which in turn relates to third grade performance), or it is not large enough to be statistically significant.

Comparisons of the predictive power of school readiness levels across different student groups revealed that readiness levels generally were a stronger predictor of third grade performance for Hispanic/Latino students than for other students. The association between kindergarten readiness levels and third grade ELA test performance was similar for English Learners (EL) and Non-EL students. Kindergarten readiness was a slightly better predictor of Math scores for Non-EL students than for EL students.

The Importance of Having Skills in Both Kindergarten Academics and Self-Regulation

Follow-up analyses looking at students with different combinations of Kindergarten Academics and Self-Regulation skills show that it is important to be strong in both of these readiness domains in order to increase a student’s likelihood of third grade academic success.¹

As the next two figures show, students who had strong skills in both Kindergarten Academics and Self-Regulation as they began school were almost three times more likely to be “Proficient” or “Advanced” on their English-Language Arts CSTs than students who had poor skills in these areas, and they were almost twice as likely to be “Proficient” or “Advanced” on their Math CSTs. Conversely, students with low skill levels in both Kindergarten Academics and Self-Regulation were more than five times as likely to score at the lowest levels on their English and Math CSTs – “Far Below Basic” or “Below Basic” – as students who had strong skills in both of these areas at kindergarten entry.

¹ For more specific information displaying the nature of the statistical interaction for CST scores used in the regressions (rather than levels displayed in the following figures), see full report text.
Taking a Closer Look at the Academic Paths of the Most and Least Ready Kindergarteners

Ready for School at Kindergarten… But Struggling at Third Grade

According to the regression analysis results, students with strong skills in both Kindergarten Academics and Self-Regulation were the most likely to be academically successful at third grade. As the following figure shows, of the subset of students with strong skills in Kindergarten Academics and Self-Regulation, most of these students (68%) were very successful on their third grade tests.
Figure E: Third Grade Outcomes of Kindergarteners Who Were Poised to Succeed When They Began School

Skills at kindergarten...

- Low K Academics, High Self-Regulation: 16%
- High K Academics, Low Self-Regulation: 18%
- Low on both K Academics and Self-Regulation: 28%
- High on both K Academics and Self-Regulation: 39%

Of the 39% of students ($n = 516$) who were poised for success at kindergarten (students strong in both Kindergarten Academics and Self-Regulation skills), where did they end up at third grade?

And outcomes at third grade...

- HIGHLY SUCCESSFUL at third grade
  - At grade level on both ELA and Math CSTs ($n = 347$): 68%
- NOT SUCCESSFUL at third grade
  - Below grade level on both ELA and Math CSTs ($n = 59$): 11%
  - At grade level on only one CST ($n = 107$): 21%
- SOMEWHAT SUCCESSFUL at third grade

Source: Kindergarten Observation Form and individual school district data.

Note: Students were designated as being high on Kindergarten Academics and Self-Regulation if they scored above the mean score on each readiness domain. An additional three cases were not included in third grade outcome categories because they lacked either ELA or Math CST score data.

However, a small number of the students who were poised to succeed at kindergarten entry were actually struggling at third grade. As the above figure shows, 11 percent of the students who appeared likely to succeed based on their skills at kindergarten were scoring below grade level on both their third grade ELA and Math CSTs. How did these students differ from those who followed a more “expected” academic path, based on their school readiness levels? Comparisons of these students suggested that the fully-ready students who fail to thrive in their early elementary school years were more likely to be:
- Younger than their peers (i.e., a greater percentage turned 5 after September 1 of their kindergarten year);
- English Learners,
- Hispanic/Latino students,
- Students from lower-income families, and
- Students with mothers who had lower education levels.

Looking at their family activities, students who were both poised for success at kindergarten and who were performing at grade level at third grade came from families that were more likely to report daily reading and singing songs and telling stories at kindergarten, as compared with the students who were well-prepared for school but ended up being less academically successful at third grade.

**Unprepared at Kindergarten… But Thriving at Third Grade**

Another group of students were struggling as they entered kindergarten based on their Kindergarten Academics and Self-Regulation skills but had “beaten the odds” and were thriving by third grade. As the figure on the following page shows, 28 percent of the students in the sample appeared to be unprepared at kindergarten, based on their readiness levels. Among this group of students, however, some (21% of this subset) had managed to gain ground during their early elementary school years and were achieving at grade level on both ELA and Math CSTs at third grade.
Figure F: Third Grade Outcomes of Kindergarteners Who Were Not Well-Prepared When They Began School

Skills at kindergarten...

- High K Academics, Low Self-Regulation 18%
- High on both K Academics and Self-Regulation 39%
- Low K Academics, High Self-Regulation 16%
- Low on both K Academics and Self-Regulation 28%

Of the 28% of students (n = 371) who were unprepared at kindergarten (students with needs in both Kindergarten Academics and Self-Regulation skills), where did they end up at third grade?

And outcomes at third grade...

- Somewhat Successful at third grade
  - At grade level on only one CST (n = 112) 31%
- Highly Successful at third grade
  - At grade level on both ELA and Math CSTs (n = 76) 21%
- Not Successful at third grade
  - Below grade level on both ELA and Math CSTs (n = 177) 49%

Source: Kindergarten Observation Form and individual school district data.

Note: Students were designated as being low on Kindergarten Academics and Self-Regulation if they scored below the mean score on each readiness domain. An additional six cases were not included in third grade outcome categories because they lacked either ELA or Math CST score data.

Among the students who came into kindergarten relatively unprepared, those who were academically successful and not successful at third grade were again most strongly differentiated by demographic and socioeconomic factors. Asian and Caucasian students were more likely than Hispanic/Latino students to “make up” for low readiness levels and succeed on their third grade tests, as were children from higher-income families and families with higher maternal education levels.
There were fewer young children (turning 5 years old after September 1) among the group that “beat the odds” and achieved academic success than there were in the “Not successful at third grade” or “Somewhat successful at third grade” groups. However, young children were more common in the “Somewhat successful” group than the “Not successful” group.

Surprisingly, trends generally showed that the unprepared kindergarten students who were the most academically successful at third grade were not more likely at kindergarten to have been exposed to many daily activities at home. Perhaps the students who were unprepared at kindergarten and had “beaten the odds” were exposed to especially effective instruction in the years prior to their third grade academic tests.

**Were Students Who Were Less Ready for School at Kindergarten Able to Close the Gap by Third Grade?**

Several years of readiness assessment data have shown that students from some demographic and socioeconomic backgrounds tend to enter kindergarten with lower readiness levels than their peers. A set of analyses examined how different groups of students progressed between kindergarten and third grade. Were the students who started school with lower readiness levels able to “close the gap” by third grade? Did the gap widen for any groups of students between kindergarten and third grade? These analyses compared the following groups of students:

- Boys and girls;
- Younger and older students;
- Low, middle, and high-income students;
- English Learners and students proficient in English;
- Hispanic/Latino, Asian, and Caucasian students;
- Students with and without preschool experience; and
- Students with different kindergarten Readiness Portraits.

Some students who began kindergarten behind their peers in terms of their readiness levels were able to eliminate or shrink the gap by third grade. For example, boys and girls were very similar in their third grade scores (particularly in Math) despite boys being far behind girls when they began school.

The figure that follows reveals that students with different Readiness Portraits—that is, with different patterns of readiness strengths and needs at kindergarten entry in the four Basic Building Blocks—were much less different from each other at third grade on their English-Language Arts CSTs than they had been at kindergarten entry. However, gaps still persisted at third grade between the most and least ready students. Trends examining students’ Math CST scores at third grade were similar to these.
Figure G: Size of the Readiness and Test Score Gaps at Kindergarten and Third Grade ELA, By Readiness Patterns

Source: Kindergarten Observation Form and individual school district data.

Note: This chart is based on the following sample sizes: 628 “Near proficiency in all,” 306 “Strong in Academics,” 273 “Strong in Soc/Emo,” and 116 “Needs in all.” On overall readiness, the “Near Proficiency” group had significantly higher scores than all others; “Strong in Academics” and “Strong in Soc/Emo” were statistically similar, and both had significantly higher scores than the “Needs in all” group. On ELA scores, the “Near Proficiency in all” group had significantly higher scores than all others; “Strong in Academics” had significantly higher scores than the other two groups, and the “Strong in Soc/Emo” and “Needs in all” groups were statistically similar.

Gaps also persisted at third grade between students who had and had not attended preschool. Students who had attended preschool were still performing significantly better than their non-preschooled peers on third grade Math and English-Language Arts CSTs, although the gap between the scores of these two groups had narrowed somewhat between kindergarten and third grade. Similar patterns were observed for younger students (those who turned 5 after September 1 of their kindergarten year), as compared to their older peers.

For some groups of students, initial performance gaps at kindergarten had actually widened further by third grade. High-income students had entered kindergarten with stronger readiness skills than their lower-income peers, and their scores at third grade suggested that the performance gap was increasing with time rather than decreasing.

The most dramatic increase in the performance gap occurred in the ELA scores of Hispanic/Latino students versus other students, however. There were initial differences among Caucasian, Asian, and Hispanic/Latino students at kindergarten entry, but the performance “spread” for Hispanic/Latino versus other students actually increased by about 50% by third grade.

It is important to keep in mind that these are univariate analyses, meaning that they look at one variable at a time, in isolation from other, related variables. Thus these analyses do not provide as complete an explanation of trends as do the regression analyses, which are able to simultaneously account for multiple factors working together (and of course, neither analysis allows for causal conclusions to be drawn). For example, in this sample, race/ethnicity differences are very closely linked to income differences. Hispanic/Latino families were much more likely to be low-income than families from other racial/ethnic groups, so the differences observed across the different racial/ethnic groups also reflect the groups’ income differences.
Were School Readiness Levels Associated with Other School Outcomes, Such as Reclassification as Fluent in English, School Attendance, or Retention in Kindergarten?

School readiness levels assessed at kindergarten entry via the KOF were associated with other outcomes besides third grade performance in Math and English-Language Arts CSTs. English Learners with strong readiness skills at kindergarten entry – particularly in Kindergarten Academics – performed better on tests measuring their English language skills at all grades from kindergarten through third grade.

Similarly, students who were reclassified at some point between kindergarten and third grade as English-proficient had initial readiness levels that exceeded those of their non-reclassified EL peers on all of the Basic Building Blocks of readiness.

Figure H: Average Readiness Scores for English Learners as a Function of Reclassification Status by Third Grade

Source: Kindergarten Observation Form and individual school district data.

Note: Scale points are as follows: 1 = Not yet, 2 = Beginning, 3 = In progress, 4 = Proficient. Sample size = 252 reclassified students and 498 non-reclassified students. Reclassified and non-reclassified students differed significantly from each other overall and on all Basic Building Blocks, according to t-tests (all p’s < .05).

Analyses were also conducted to investigate whether school readiness was associated with family practices such as ensuring that students attend school and have low absenteeism, which in turn has been shown to relate to students’ school performance (Ready, 2010). Results showed that readiness was weakly associated with school attendance rates at kindergarten, but not in later grades. The strongest association between kindergarten attendance and readiness levels was observed for Kindergarten Academics skills ($r = 0.16$).

A small number of students (2% of the students for whom these data were provided) were retained to repeat kindergarten, and their readiness levels at kindergarten entry were compared to those of their classmates who were not retained in kindergarten. Results revealed that the retained students were much further behind their peers on social-emotional and self-care domains of readiness than on the strictly academic types of skills, suggesting that decisions about kindergarten retention have more to do with maturation factors than meeting certain academic performance standards.
How Did the Students in the Two Counties Compare to Each Other?

Although there were many similarities in the trends observed in Santa Clara and San Mateo counties, some differences emerged as well:

- Data suggested that although sampled students in Santa Clara County started kindergarten less ready than sampled students in San Mateo County, the Santa Clara County students had more than made up for this difference by third grade – performing slightly better than their peers in San Mateo County.

- Regression analyses conducted separately for students in each county suggested that readiness levels explained more of the third grade scores of Santa Clara County students than they did for San Mateo County students, whose scores were in turn explained more by factors related to students’ demographic and socioeconomic backgrounds.

- Finally, analyses looking at whether students who started kindergarten with lower school readiness scores were able to close the performance gap by third grade revealed that these gaps were more likely to persist (and sometimes get larger) at third grade for San Mateo County students than for Santa Clara County students.

All of the findings related to cross-county differences should be considered preliminary. Because the samples are not representative at the county level, and because we do not have additional information about school and classroom impacts on learning from kindergarten through third grade, it is difficult to know what could be driving the differences observed between the two counties. It is hoped that presenting information about the differences observed will serve as an initial step to stimulate discussion between districts about what the data mean – and if they may be reflecting successful policies or practices that are improving student achievement levels in the early elementary grades.
Implications and Recommendations

Better Outcomes Ahead for Third Grade Scores?

Combining these longitudinal results with more recent data from readiness assessments conducted in both Santa Clara and San Mateo counties in 2008 (and assuming similar associations between readiness and third grade tests), we would expect more students to be achieving at grade level by the time they take their third grade CSTs in Spring 2012. This is due to trends in which students are entering kindergarten with somewhat stronger skills in Kindergarten Academics, although they have generally not shown improvements in their Self-Regulation skills.

Acknowledging the Important Role of Early Elementary (K-3) Education

Of course, as we offer predictions about possible trends in student achievement, it is important to keep in mind that elementary school education plays an enormous role in determining how well a child does at third grade – a role that was not able to be explored in this project. The strength of the relationship between school readiness and later academic performance will vary from one region to another, and from one period of time to another, based in part on the quality of the early elementary school environments that receive children as they enter kindergarten – ready (or not) to learn.

Working with Parents and Early Care and Education Providers to Ensure that Learning is Well Under Way Before Kindergarten

The strong associations between school readiness and later school performance underscore the need to help children begin their learning long before they enter kindergarten. These longitudinal data show that what children learn even before they enter kindergarten may impact their third grade scores, which in turn are a strong predictor of even longer-term outcomes such as high school graduation rates (Annie E. Casey Foundation, 2010). Recent work to develop statewide measurement standards that ensure high-quality, developmentally-appropriate ECE experiences are a step in the right direction, as are increasing efforts toward better communication and alignment between ECE and elementary school systems.

Reducing Barriers to Answering Important Questions in Education Research

Across the 19 districts that participated in this project, no two were alike in terms of their data systems or their requirements for sharing data with external research organizations. The complexity of working differently with each of the 19 districts – combined with the significant time and financial resources this process consumed – creates a situation that makes research a very difficult endeavor. This is particularly unfortunate given current concerns about the effectiveness of our education system and the need for high-quality education research to better understand problems such as improving student test scores, closing the widely-observed achievement gap among California’s students, and working effectively with the increasing numbers of students who are learning English in an English-based education system. Districts looking to contribute to increasing our understanding of what works (and what doesn’t) in education might consider moving toward more cross-district collaboration as they design or update their data systems and protocols.