Ninth Grade Newcomers in the Fort Worth Independent School District

Predictors of Graduation Outcomes

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QUALITYTEACHING for English Learners®
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Exploring Longitudinal Outcomes and Trajectories of English Language Learners (ELOTE)

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Executive Summary

This report is part of a long-term collaboration of the Quality Teaching for English Learners initiative at WestEd with the Fort Worth Independent School District. The objective of this report is to explore how ninth grade data can predict the graduation outcomes of newcomers. Based upon predictor variables, we construct binary indicators for students "at risk" of not graduating. We compare the utility of English language proficiency measures and attendance in the ninth grade year for predicting graduation.

Key Findings

- Higher ninth grade TELPAS Speaking and Listening ratings were associated with higher graduation rates. For example, students rated as at the Beginning level on Speaking graduated at a rate of 46%, compared to 61% among students rated at Advanced or higher. These differences were similar in the Listening domain, with students rated Beginning less likely to graduate (46%) than students rated Advanced or higher (60%). These associations were not statistically significant.
- The association between TELPAS Writing and graduation was both stronger and statistically significant. Students rated as Advanced or higher in Writing were much more likely to graduate (65%) than students rated Beginning (41%). The TELPAS Reading score and attendance (measured as days absent) were statistically significant predictors of the graduation outcome. That is, there is a relationship between these predictor variables and the probability of students graduating.
- Creating indicators to identify students who are "at risk" of not graduating must simultaneously identify as many non-graduates as possible while identifying a group that actually had a low graduation rate.
- For example, if a score lower than 650 on the TELPAS reading is used to identify students at risk of not graduating, 50% of all non-graduates will be identified, but 40% of "at-risk" students will actually graduate.
- Alternatively, if students absent at least five days are identified as "at risk", 83% of all non-graduates will be identified. The graduation rate of students with this many absences, however, is 45%. Because this rate is close to the overall graduation rate of 47%, the students identified by this indicator were not actually much less likely to graduate.
- Combining predictor variables may yield better indicators. For instance, one way to define "at-risk" is as: 1) a TELPAS Reading score of less than 646, ***OR*** 2) more than eight days absent. This at-risk indicator definition would identify 70% of all non-graduates, and "at-risk" students would graduate at a rate of 40%.
- Including even more predictor variables may yield better indicators. Promising variables include course performance and credit accumulation.

Exploring Longitudinal Outcomes and Trajectories of English Language Learners (ELOTE)

Project ELOTE is a Researcher-Practitioner Partnership funded by the Institute of Education Sciences.[1] Researchers from the Quality Teaching for English Learners initiative at WestEd partner with practitioners in the Fort Worth Independent School District (FWISD) to investigate academic trajectories and outcomes of secondary immigrant newcomers. The partnership describes academic trajectories and identifies promising programs and practices for newcomers. This report is part of Phase One, a longitudinal analysis of extant administrative data from FWISD. The results from Phase One will enable the identification of schools sites for Phase Two, which consists of case studies of promising programs and practices. These two phases will directly inform policy and practice within the district.

English Language Learners in Texas and Fort Worth

English language learners (ELLs) are a large and growing population within the United States, Texas, and Fort Worth. Nationally, ELLs constitute 9.1 percent of the K-12 public school population, or 4.4 million students in the 2011-2012 school year (Kena et al., 2014). Texas enrolled approximately 809,000 ELL students in the 2013-14 school year, or 16.5% of all K-12 public school students (Texas Education Agency, 2015). Within the Fort Worth Independent School District (FWISD), the ELL population has grown both numerically and as a fraction of the total school population, from 21,300 in 2003-2004 to 25,800 in 2013-2014, corresponding to an increase from 26.6% to 30.6% of the district population. Ensuring that the unique educational needs of ELLs are met is an urgent priority.

Although the majority of ELLs at the national, state, and district levels are concentrated in the elementary grades, immigrant newcomers constitute a substantial fraction of the secondary ELL population. In FWISD, about 40% of ninth grade ELLs are new immigrants, and about 15% of ninth grade ELLs immigrated during the middle school years. Within FWISD, all secondary immigrant newcomer students attend the International Newcomer Academy (INA) for one year. At INA, students attend content-area classes taught by teachers who work in interdisciplinary teams sharing a group of students. After that initial year at INA, students enroll in Language Center programs hosted at four middle schools and seven high school sites for one or two years. These Language Centers provide sheltered support in content-area classes for academic and English language development. As students make progress in English proficiency, they enroll in Transition English as a Second Language (ESL) or mainstream classes. This sequence of programs is different from those in other districts across the state and country, which may include mainstream classes with various models of ESL support, small programs hosted at comprehensive high schools, two-year programs for newcomers, or four-year newcomer high school programs.

[1] The research reported here was supported by the Institute of Education Sciences, U. S. Department of Education, through Grant R305H140032 to WestEd. The opinions expressed are those of the authors and do not represent views of the Institute or the U. S. Department of Education.

Predictors and Indicators of Graduation

This report builds upon a previous report which described the trajectories and outcomes of a cohort of 275 students who enrolled as first-time ninth graders at the International Newcomer Academy (INA) in the 2009-2010 school year (Chu & Fong, 2015). By the end of the 2013-2014 school year, these students had either graduated (128 students, or 47%) or left the district as non-graduates (147 students, or 53%). The objective of this report is to explore variables available in the first year of the study which predict graduation outcomes. These predictors could be combined to produce early warning indicators of students at-risk for not graduating.

We distinguish in this report between predictors—which are continuously scaled, like probabilities—and indicators, which are binary. Indicators are yes-or-no variables which may be more useful to practitioners because they suggest whether or not to target a student for intervention. To have practical validity, an indicator ought to correspond to a variable connected at face value to the outcome of interest. Continuous predictors can be used to create indicators with empirically set cut-off points, which in turn drive programmatic decisions.

In this report, we are interested in "at risk" indicators for the outcome of non-graduation. Three measures need balancing, depending on the priorities and resources of policymakers. The first is the overall accuracy ("Accuracy"), which is the percentage of all students for which the indicator and the outcome matched perfectly. The Accuracy of an indicator is of particular interest to researchers as it provides a measure of how closely the indicator matches the outcome. This perfect matching may be less important in practice and making policy. For instance, if an intervention has no negative side effects for participants, perfect accuracy may be less important than identifying more students who are at risk.

Therefore, a second measure is the non-graduate identification rate ("Identification Rate"), or the percentage of all non-graduates who are identified as "at risk". This Identification Rate alone is not enough because an indicator that identified all students as "at risk" would necessarily identify all non-graduates. Accuracy therefore serves as an important check on the overall quality of an indicator.

The last measure is the "At-risk Graduation Rate", the percentage of "at risk" students who actually did graduate. This "At-risk Graduation" rate is part of the inaccuracy of the indicator, as the student did actually graduate even though the indicator identified him or her as "at risk".

It is desirable for Accuracy and the at-risk Identification Rate to be high. Meanwhile the third measure, the At-risk Graduation Rate, ideally should be lower, and a reasonable benchmark for comparison is the observed graduation rate for all newcomer students.

This study contributes to understanding of indicators of graduation outcomes by centering analysis on a cohort of secondary immigrant newcomers. Most studies begin with all ELLs in a district and then specify predictors to subgroups including newcomers (e.g., Gwynne, Ehrlich, Pareja, & Allenworth, 2012). Other studies, which begin with the population at large, find that "on-track" indicators have less predictive power for ELLs, and do not report the strength of indicators for high school newcomers as a subcategory (Kemple, Segeritz, & Stephenson, 2013). This study specifically seeks to explore whether extant variables can provide guidance about how to target newcomers for interventions.

Research Questions

This report answers the following research questions:

I. To what extent is first-year English language proficiency associated with graduation outcomes?

II. To what extent do first-year English Reading proficiency and attendance predict graduation outcomes?

I. To what extent is first-year English language proficiency associated with graduation outcomes?

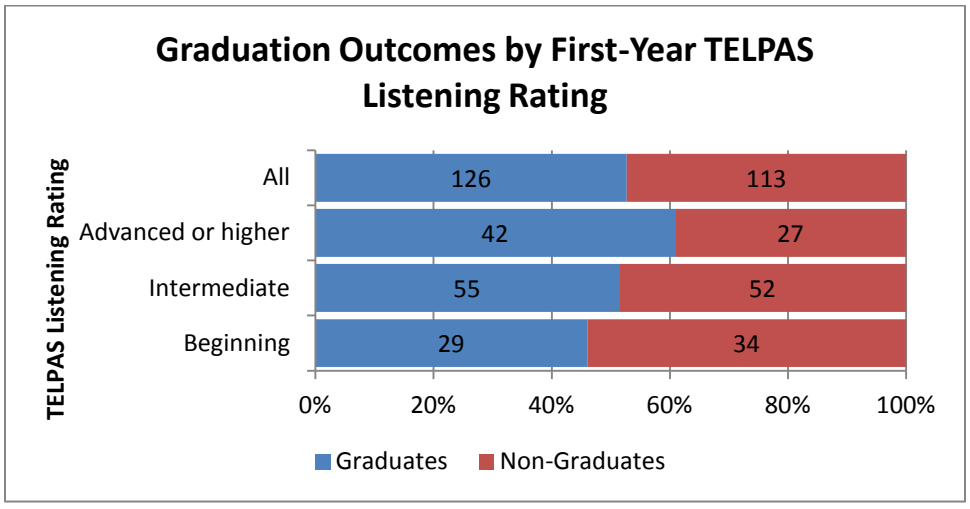
Students' English language proficiency is measured in this report using the Texas English Language Proficiency Assessment System (TELPAS). The TELPAS consists of four domains: Speaking, Listening, Reading, and Writing. The Writing rating is based upon holistically rated student writing collections, while the Speaking and Listening ratings are holistically assessed by ongoing classroom observation. The numerical values of the ratings range from 1 to 4 and correspond to the following performance levels: Beginning, Intermediate, Advanced, and Advanced High.

The focus of this section will be the Speaking, Listening, and Writing ratings, because they are ordinal variables.[2] We cross-tabulate first-year ratings in each of these three domains with the dichotomous graduation outcome. We then report and compare graduation rates for rating subgroups. We assess the significance of associations with the appropriate statistical tests. First-year TELPAS scores were available for 239 out of 275 students (87%). Among tested students, the graduation rate was 53%, the figure which serves as the benchmark for subsequent comparisons in this section.

Students who were rated Advanced or higher[3] in Listening were approximately 8 percentage points more likely to graduate (61%) than the rest of the cohort (see Figure 1). Students who were rated Beginning in Listening were approximately 7% less likely to graduate (46%). The largest Listening subgroup was students rated Intermediate, and they were slightly less likely to graduate (51%) than the group at large (see Table 1).

Figure 1

Graduation Outcomes by First-Year TELPAS Listening Rating



[2] The TELPAS Reading scores are reported as ordinal performance levels. The Appendix includes an analysis of this variable, but we omit it from this section because we analyze Reading as a continuous variable in the next section.
[3] To avoid expected values of less than 5 per cell, we combined the Advanced High level with the Advanced level to form the "Advanced or higher" category.

Table 1

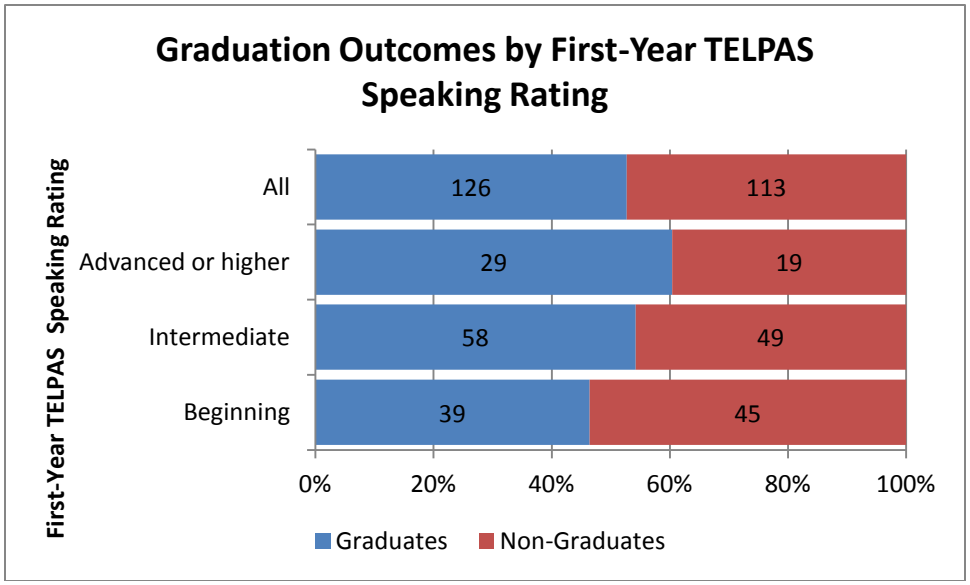
Ratings Levels and Graduation Rates for First-Year TELPAS Listening, Speaking, and Writing

	Listening		Speaking		Writing	
Rating Level	Number of Students	Graduation Rate	Number of Students	Graduation Rate	Number of Students	Graduation Rate
Beginning	63	46%	84	46%	68	41%
Intermediate	107	51%	107	54%	131	55%
Advanced or higher	69	61%	48	60%	40	65%

In terms of Speaking, more students were rated as Beginning (84 students, or 35%) as compared to the Listening domain, but the Beginning students on Speaking were about as likely to graduate (46%) as those rated Beginning in Listening. Compared to Listening, fewer students were rated as Advanced or higher in Speaking (48 students, or 20%), and these students were approximately 7% more likely to graduate (60%) than the group at large (see Figure 2).

Figure 2

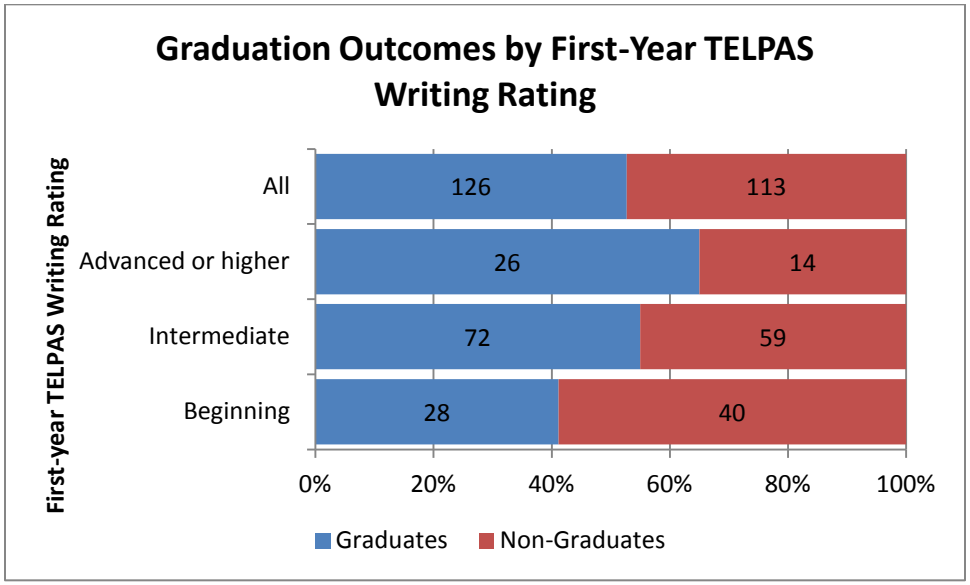
Graduation Outcomes by First-Year TELPAS Speaking Rating



ELOTE is a Researcher-Practitioner Partnership funded by the Institute of Education Science R305H140032

Figure 3

Graduation Outcomes by First-Year TELPAS Writing Rating



Students rated as Advanced or higher on Writing were the most likely to graduate (65%), approximately 12 percentage points more likely than the average of all tested students (see Figure 3). Conversely, students rated as Beginning in Writing were much less likely (41%) to graduate, the lowest of any subgroup. Writing ratings were the most strongly associated with graduation outcomes.[4]

[4] To determine whether these associations were statistically significant, we performed a chi-squared test for independence between ratings levels and graduation outcomes. Graduation outcomes were not significantly associated with first-year Listening ratings ($\chi^2(2)=3.0437$, $p=0.2183$) or Speaking ratings ($\chi^2(2)=2.5694$, $p=0.2767$). The null hypothesis that first-year Writing ratings and graduation outcomes were independent was rejected at the 5 percent significance level ($\chi^2(2)=6.3193$, $p=0.04244$).

Predicting Graduation Outcomes with Listening, Speaking, and Writing Ratings

Because most students (45% to 55%) were Intermediate and the graduation rates of the Intermediate students were close to the aggregate rate of 53% (51% to 55%), these ratings do not produce high-accuracy indicators of the graduation outcome. Some indicators, however, may be sufficient depending on the nature and the scope of the intervention.

For instance, to construct an "at risk" indicator for non-graduation based upon the domain with the strongest association, we could classify all students who rated as Beginning in Writing as "at risk" of dropping out. This indicator would identify 68 students, 40 of whom ended up as non-graduates. The overall accuracy of this indicator would be 58% (it correctly identified 40 non-graduates as "at risk" and 98 graduates correctly as not "at risk", a total of 138 out of 238). This indicator has an Identification Rate of 35% of all non-graduates (40 out of 113). On the other hand, 41% of the students the indicator identifies as "at risk" actually graduate (28 out of 68). Overall, while this indicator does identify students approximately 12% less likely to graduate, it only identifies over a third of students who end up not graduating. This indicator might be appropriate for an expensive intervention which could not be offered to many students. Any improvements to the graduation rate, however, would have to be compared against the baseline graduation rate of 41% within the group of identified students.

If, on the other hand, the objective was to identify more students who end up not graduating, students who were Intermediate in Writing may also be identified as "at risk". This inclusion improves some measures but moves other measures in the wrong direction, as Intermediate students in Writing are actually no less likely to graduate than average. This choice would identify a total of 199 students as "at risk", of whom 99 actually dropped out. The overall accuracy of this indicator is 52% (correctly identifying 99 non-graduates and 26 graduates, or 125 out of 238). This indicator has an Identification Rate of 87% of all non-graduates (99 out of 113), and an At Risk Graduation Rate of 50% (100 out of 199). Although this expanded indicator has a much higher Identification Rate (identifying five out of six eventual non-graduates), the students it identifies on average graduate at a rate (50%) very close to that of all tested students. Because many more students would be identified as "at risk", the delivery of the intervention would be most costly.

These considerations point at the need to find some way of identify students who are "at risk" *within* the Intermediate level in terms of English language proficiency. To do so, we will use a continuous predictor variable in the next section.

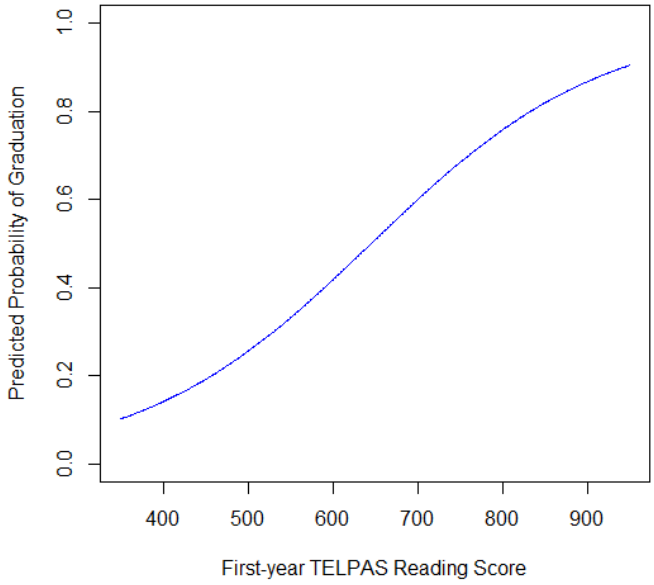
II. To what extent do first-year English Reading proficiency and attendance predict graduation outcomes?

This section considers the extent to which two first-year variables—English Reading proficiency and attendance–predict graduation outcomes. The TELPAS Reading score is a continuously scaled variable ranging from 340 to 950[5]. The attendance variable is measured as the number of days absent in the first school year, and ranged from 1 to 65. Data was missing to different degrees: 243 students had a Reading score, while 269 students had attendance data.

Reading Proficiency and Attendance as Predictors

For both variables, we employed separate logistic regression models,[6] with the results showing how the probability of graduation changes as the predictor varies. These probabilities are easier for practitioners to interpret than raw values of variables such as Reading scale scores, and provide more information than discrete categories such as the TELPAS performance levels, which may combine groups of students with different proficiency levels and therefore needs.

Figure 4
Predicted Probability of Graduation by TELPAS Reading Score



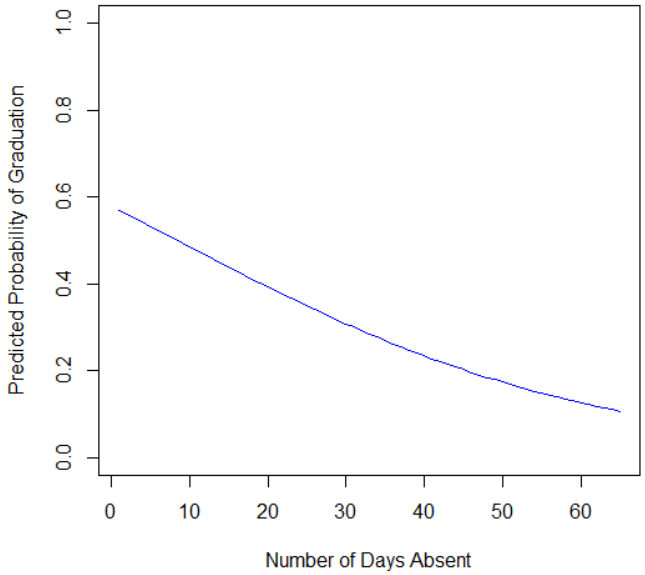
For example, this graph shows that a student scoring 650 on the TELPAS reading in the first year has a predicted probability of graduation of approximately 50% (about the aggregate average). For a student scoring at the lower end of Advanced, a scale score of 680, the predicted probability of graduation is 56%. A student scoring above 740 (Advanced High) has at least a 67% predicted probability of graduation.

[5] In the 2009-2010 administration, a TELPAS score below 633 was considered Beginning, Intermediate was 634-680, Advanced was 681-737, and any score 738 or above was Advanced High.

[6] The equation in each case was $\ln(p/(1-p))=\beta_0+\beta_1 x+\varepsilon$. x was either the TELPAS Reading Scale Score or the Number of Days Absent.

Figure 5

Predicted Probability of Graduation by Number of Days Absent



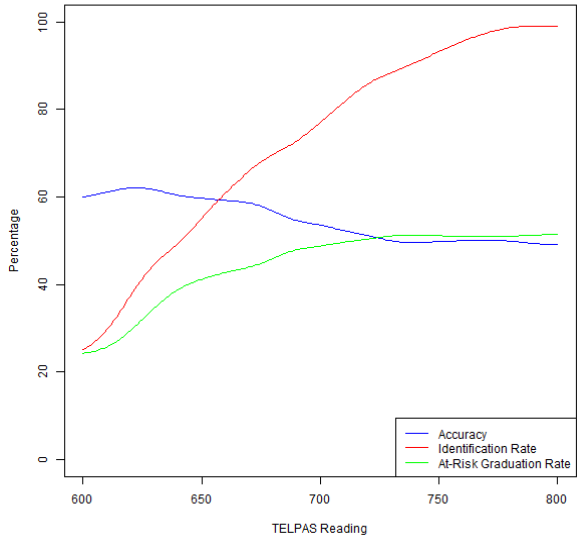
The predicted probabilities of graduation based upon days absent has two notable features (Figure 5). First, the curve runs in the opposite direction from Figure 4, meaning that predicted probability declines as absences increase. The shape of this graph makes sense as students with more absences in the freshman year are less likely to graduate. Second, the predicted probability of graduation given no absences is somewhat low at 58%. Although this value of this predicted probability is low, it is worth comparing to the predicted probability for a student scoring 680 on the TELPAS Reading, which was 56%. Reporting probabilities thus provides a means to compare variables as different as attendance and Reading test scores.

From Predictors to Indicators

The analyses in the previous section enable modeling probabilities from the two variables. To create indicators of student who are "at risk" of not graduating requires setting cut-off values. These values can be set using the probabilities derived from the logistic regression, or by directly using the variables. In this section, we first model using the raw values of reading proficiency. We use raw values because they are the most practically accessible to and readily interpretable by practitioners. At the end of this section, when we combine the two indicators, however, we will use probabilities, as that common scale enables us to combine test scores with absences.

Figure 6

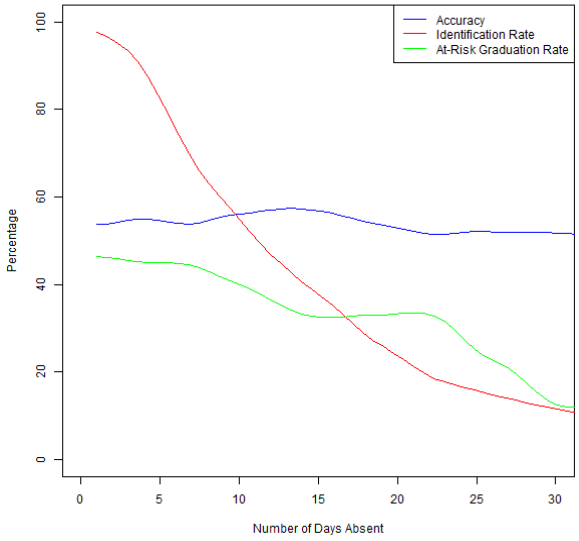
Indicator Performance by Cut-Off Position, TELPAS Reading Scale Score



Setting the level for an at-risk indicator based upon the TELPAS Reading Scale Score requires some trade-offs between accuracy, identification, and mis-identifying students as at-risk who actually will graduate (Figure 6). For example, using 650 as a cut-off (meaning everyone who scores below a 650 is "at risk") will identify 57% of all students who actually do not graduate ("Identification Rate"). Approximately 40% of the students who are identified as at risk, however, will graduate (“At-Risk Graduation Rate”), and the indicator will have an overall accuracy of 60% (“Accuracy Rate”). One reasonable approach is to use the observed graduation rate as a cut-off. A TELPAS Reading scale score of 670 corresponds to a 54% percent chance of graduation, the graduation rate for students with scores. Using this cut-off would identify 66% of all non-graduates, while students identified as "at-risk" would have graduated at a rate of 43%. The overall accuracy of this indicator would still be 60%, but there would be an increase in the Identification Rate.

Figure 7

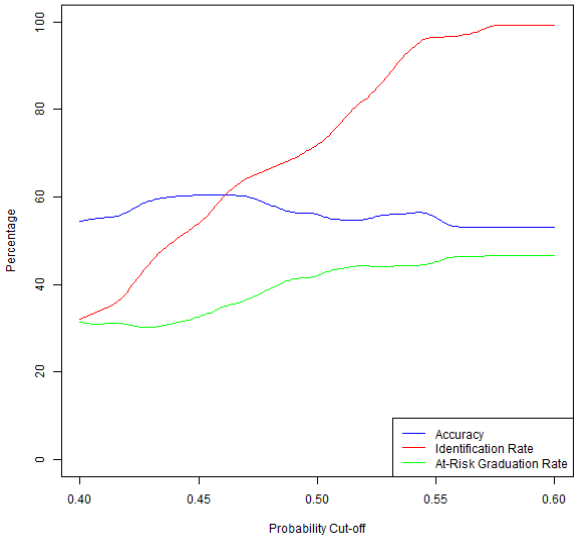
Indicator Performance by Cut-Off Position, Number of Days Absent



When considering attendance, students are at risk if they have more than a given number of absences(Figure 7). For example, if the cut-off is five days (students with at least five absences are "at risk"), approximately 83% of all non-graduates will be identified (“Identification Rate”). The graduation rate of those then identified at risk (“At-risk Graduation Rate”), however, is 45% and approximately equal to the overall value of 47%. If a higher threshold of ten days absent is selected, less than 60% of non-graduates will be identified as at risk ("Identification Rate"), but the graduation rates of those at risk ("At-risk Graduation Rate") will be approximately 40%. In this case, the overall accuracy ("Accuracy Rate") is about the same (54%).

Figure 8

Indicator Performance by Cut-Off Position, Joint Probability Cut-off



One option for constructing indicators with higher accuracy and identification is to combine the TELPAS reading and absences data, in the form of probabilities of graduating (Figure 8). A student is at risk if either predicted probability is less than the cut-off value. For example, if 0.45[7] is used as the cut-off for at-risk, approximately 45% of all non-graduates will be identified ("Identification Rate"), but approximately 30% of all "at risk" students will end up graduating ("At-risk Graduation Rate"). Alternatively, a probability of 0.50[8] identifies 70% of all non-graduates ("Identification Rate") but 40% of all "at risk" students will end up graduating ("At-risk Graduation Rate").

These values can be used to make decisions about the scope of interventions in terms of the number of students that can be served. Attending to these values will enable policymakers to more efficiently target students who are at greater risk of not graduating, while not identifying students who are more likely to graduate.

[7] This probability corresponds to more than 14 days absent or a TELPAS Reading score below 620.
[8] This probability corresponds to more than 8 days absent or a TELPAS Reading score below 646.

Implications

This analysis of a historical cohort provides some insights into how data available early in a newcomer's enrollment in the district is associated with summative outcomes. Because only two continuous variables were available, the accuracy of predictors was limited. If more data—such as grade point average, course completion, and credit accumulation—were available, the accuracy of predictors could be improved. Other studies in other contexts have pointed at the promise of these variables, even though those studies have not focused explicitly on the subgroup of newcomers (e.g., Gwynne, et al., 2012).

As policymakers and practitioners explore interventions to improve newcomer retention and graduation, they will have to consider how to best target interventions on newcomers most at-risk of not graduating. Because interventions have a financial cost, policymakers will have to balance the rate at which "at risk" students are identified with the accuracy of the indicator. Some interventions may be lower cost, in which case more students can participate, including students who would have graduated even without the intervention. Other interventions may be more limited in scope and may need careful selection of participants using multiple criteria beyond the indicators identified in this report.

This report focused on predictors and indicators based upon data from a student's first year of enrollment within the district. Tiered interventions may also be implemented by incorporating more data from later years of a student's enrollment, such as attendance or course performance in subsequent years of enrollment (Frazelle & Nagel, 2015). Intervention systems may have multiple components which address different indicators, with varying degrees of response, ranging from school-wide to targeted to intensive. This preliminary analysis can serve as an initial screening to identify students for further attention from campus-based staff.

Future analyses will explore campus-specific patterns and other characteristics of non-graduates.

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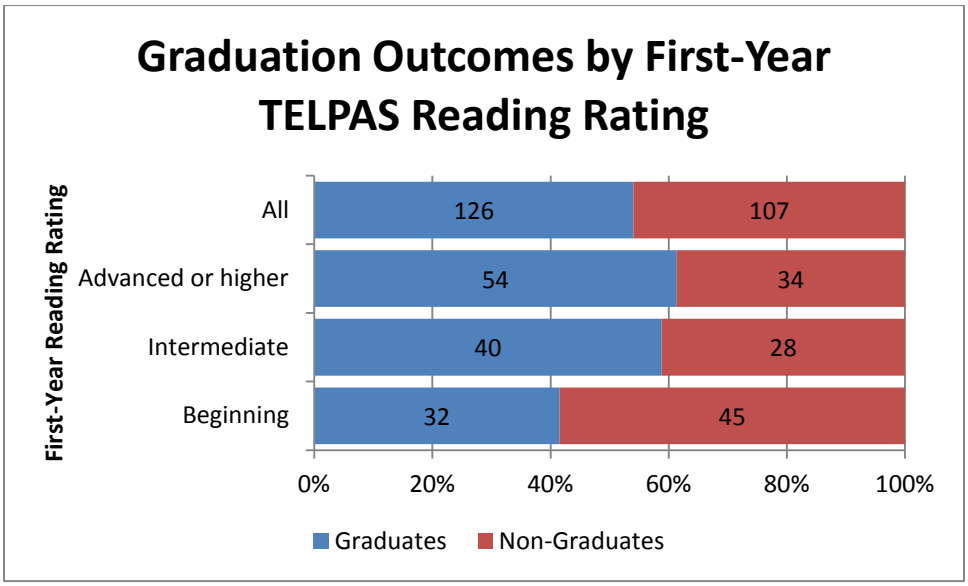
Appendix. First-year TELPAS Reading Rating and Graduation

Table A1.

	Graduate Status		
Reading Rating	No	Yes	Graduation Rate
Beginning	45	32	42%
Intermediate	28	40	59%
Advanced or higher	34	54	61%
	107	126	54%



We tested the null hypothesis that TELPAS Reading proficiency level was not associated with the graduation outcome for the 233 students who had proficiency scores. We rejected the null hypothesis at the 0.05 significance level ($\chi^2(2)=7.357$, $p=0.02526$).