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Making Connections

Are two commonly used early warning indicators accurate predictors of dropout for English learner students? Evidence from six districts in Washington state

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Key findings

Students who drop out of high school are at increased risk of a range of negative social and economic consequences. School districts are using early warning indicators, such as attendance, course failures, grade point average, and suspensions or expulsions, to identify and provide supports for students at risk of dropping out. This study in six Washington state districts examined whether two commonly used early warning indicators work equally well for English learner students. It found that:

- Students who had ever been English learners had four-year graduation rates that were 9.5 percentage points lower and dropout rates that were 0.7 percentage point higher than those of students who had never been English learners.
- Certain subgroups of English learner students had considerably different graduation and dropout rates from those of other English learner students; relative to long-term proficient English learner students, newcomer English learner students' four-year graduation rates were 33.8 percentage points lower and their dropout rates were 5.8 percentage points higher.
- The early warning indicators used by the districts were unable to accurately identify many future dropouts across the six districts, especially among newcomer English learner students.

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This report is available on the Regional Educational Laboratory website at http://ies.ed.gov/ncee/edlabs.

Summary

Students who drop out of high school are at increased risk of a range of negative social and economic consequences, including lower earnings and poorer health (Pleis, Ward, & Lucas, 2010; Rouse, 2007). To reduce dropout rates and lessen these negative consequences, districts around the country are using early warning indicators to identify and provide supports for students at risk of dropping out. Typically, these early warning indicators include some combination of attendance, course failures, grade point average, and suspensions or expulsions (Allensworth & Easton, 2007; Hartman, Wilkins, Gregory, Gould, & D'Souza, 2011; Silver, Saunders, & Zarate, 2008).

It is not clear whether these commonly used early warning indicators work equally well for English learner students. National data suggest that English learner students drop out of high school at higher rates than other students do (Kena et al., 2015; U.S. Department of Education, 2015). English learner students are a heterogeneous group that includes students born in the United States, new immigrants, and refugees, all with varying degrees of prior exposure to English and, for those not born in the United States, different education experiences prior to arrival. Some English learner students start kindergarten in this country, while others do not arrive here until they are in high school. Some English learner students may receive only two or three years of English language services, while others may receive eight or more years. Current national data do not capture the variation in dropout and graduation rates for those different types of English learner students.

This study compares data for a particular group of students—those who were classified as English learner students at any point in their K–12 education (referred to as "ever–English learner students" in this report) with data for students who were never classified as English learner students (referred to as "never–English learner students"). It also compares outcomes across subgroups of the ever–English learner student population. Specifically, the study addresses how the graduation and dropout rates of different subgroups of ever–English learner students compare with one another and with those of never–English learner students. And it examines whether two early warning indicators used to predict dropping out (six or more absences in grade 9 plus at least one course failure in grade 9, and at least one suspension or expulsion in grade 9) are accurate and useful indicators for different groups of ever–English learner students compared with never–English learner students.

The students in the study are from six school districts in the south King County area of Washington state. The districts are part of the Road Map Project, a cradle-to-career initiative that seeks to double the number of students on track to graduate from college or earn a career credential between 2010 and 2020. As part of the initiative, the districts have been using a common set of early warning indicators since 2011. The initiative also has a work group focused on the large number of English learner students in the region. Regional Educational Laboratory Northwest has partnered with the work group since 2012 to use data and evidence to better understand the needs and challenges of English learner students and to inform decisions about policy and practice.

The study findings highlight notable differences in graduation and dropout rates among subgroups of English learner students. Key findings from the study include:

- Students who had ever been English learners had four-year graduation rates that were 9.5 percentage points lower and dropout rates that were 0.7 percentage point higher than those of students who had never been English learners.
- Certain subgroups of English learner students had considerably different graduation and dropout rates from those of other English learner students; relative to long-term proficient English learner students, newcomer English learner students' four-year graduation rates were 33.8 percentage points lower and their dropout rates were 5.8 percentage points higher.
- The Road Map Project's early warning indicators, originally developed for Seattle Public Schools, were unable to accurately identify many future dropouts, especially among newcomer English learner students.

Given that the accuracy of the Road Map Project indicators varied for subgroups of English learner students and may be evidence of the need to select and validate indicators specifically for the population of interest, the Road Map Project and other states and districts may want to examine the accuracy of their own indicators for different student populations. If early warning indicators are weaker for a specific subgroup of English learner students, then teachers, counselors, and others may want to monitor the needs of that group in other ways.

Contents

Why this study?

Students who drop out of high school are at increased risk of a number of negative social and economic consequences, including lower earnings and poorer health (Pleis et al., 2010; Rouse, 2007). To reduce dropout rates, districts around the country have adopted early warning indicators to identify students at risk of dropping out of high school (for example, Allensworth & Easton, 2007; Callahan, 2013; Hartman et al., 2011). Identified students may receive tailored interventions designed to keep them in high school and help them earn a high school diploma. Typically, early warning indicators include some combination of attendance, course failures, grade point average, and suspensions or expulsions (Allensworth & Easton, 2007; Hartman et al., 2011; Silver et al., 2008).

Early warning indicators developed using data from the general student population may not be as helpful for identifying the specific risk factors for English learner students. National data for 2013/14 reveal a nearly 20 percentage point gap between the overall graduation rate (82.3 percent) and the rate for English learner students (62.6 percent), although the size of the gap varies across states (U.S. Department of Education, 2015). Limited national evidence about dropout rates among English learner students suggests that these students drop out of high school at higher rates than other students do. For example, in 2012 a quarter of Hispanic students born outside the United States dropped out of high school, compared with 6 percent of all students born in the United States (Kena et al., 2015).

National statistics on English learner students' education outcomes may also obscure the full range of this heterogeneous group's experiences. The group includes students who were born in the United States, as well as immigrants from around the world with a wide range of linguistic and academic skills. Furthermore, unlike racial/ethnic subgroups, English learner status is not a fixed characteristic—after attaining proficiency in English, these students are reclassified as former English learner students. All former English learner students may not have the same level of English proficiency because reclassification criteria vary from state to state and sometimes even within a state. In addition, because some school and district policies limit English learner students' access to core and advanced courses, the grade level in which students are reclassified as former English learner students may substantially alter students' academic experiences (Estrada, 2015; Umansky, 2015).

This study examined four- and five-year high school graduation rates and four-year dropout rates for different subgroups of current and former English learner students. It examined both graduation and dropout rates because not all students who fail to graduate are dropouts. Some students remain enrolled in school, and for other students, end-of-high school outcomes are unknown. The study also examined the accuracy of early warning indicators of dropout because that is the outcome most indicator systems are designed to predict. (See appendix A for a description of graduation and dropout rates and the accuracy of early warning indicators.)

The context for the study is the Regional Educational Laboratory Northwest's research alliance with the Road Map Project, a collective impact initiative of seven school districts in the south King County area of Washington state. These seven districts—Auburn, Federal Way, Highline, Kent, Renton, Tukwila, and the southern part of the Seattle Public Schools district—serve a highly diverse population of more than 150,000 students, 19 percent of whom are current English learner students and many more of whom are

This study examined four- and five-year high school graduation rates and four-year dropout rates for different subgroups of current and former English learner students in six school districts in the south King County area of Washington state

former English learner students (Community Center for Education Results, 2015a). The analysis covers data for only six of these districts because one district (Highline) did not provide data for this study.

Early identification of English learner students at risk of dropout is crucial for the Road Map Project to achieve its goal of doubling the number of students who are on track to graduate from college or earn a career credential by 2020, compared with the number in 2010 (Community Center for Education Results, 2015b). The initiative supports districts by monitoring and reporting how many grade 9 students are not on track to graduate. When the Road Map Project launched in 2010, some of the districts involved had not yet fully developed their own early warning indicator systems, although many had partial systems in place (Cunningham & Van Alstyne, 2012). Seattle Public Schools, the largest of the Road Map Project districts, had adopted two early warning indicators in 2009, informed in part by analyses of the district's dropout population (Celio, 2009a, 2009b, 2011). Students were identified as at risk of dropout if they reached the threshold for either indicator: six or more absences plus at least one course failure in grade 9 (indicator 1) or at least one suspension or expulsion in grade 9 (indicator 2).

Searching for common measures to use across districts, the Road Map Project adopted these indicators and currently uses them in its annual reporting on progress across districts and subgroups (Community Center for Education Results, 2011). In 2015 the initiative began comparing the percentages of current English learner students and non–English learner students (both former English learner students and never–English learner students) who trigger an indicator, but these reports do not distinguish results for former English learner students or different groups of current English learner students (Community Center for Education Results, 2015a).

This study aims to assist Road Map Project stakeholders in two ways. First, it compares graduation and dropout rates among a diverse range of English learner students: students entering grade 9 as recent U.S. arrivals, students entering high school who had been classified for several years as English learners, students reclassified as former English learners in elementary school, and students reclassified more recently. The findings may help the Road Map Project districts and others gain a better understanding of which students are at greatest risk of not graduating and therefore may need additional supports or alternative monitoring. Second, the study assesses the accuracy of the initiative's early warning indicators, with an emphasis on the indicators' ability to accurately predict dropout among English learner students. It also examines accuracy for the different subgroups of English learner students.

The findings of this study may help the Road Map Project districts and others gain a better understanding of which students are at greatest risk of not graduating and therefore may need additional supports or alternative monitoring

The study may also be useful to several national audiences. For state and local agencies and collective impact initiatives that are implementing early warning indicator systems, the study raises an important question: Are the types of indicators commonly used appropriate and accurate for all student populations? For educators working with English learner students, the study calls attention to the different experiences of subgroups within the larger category of students who were ever classified as English learner students.

What the study examined

This report presents the results of two sets of analyses. First, it compares graduation and dropout rates between students who were classified as English learner students at any point in their K–12 education (ever–English learner students) and students who were never classified as English learner students (never–English learner students), as well as four subgroups within the sample of ever–English learner students. (These subgroups are defined in box 1; more information about the study data and methods is in box 2 and appendix A.) Information about graduation and dropout rates provides context for understanding the second set of analyses, which examine the accuracy of the early warning indicators the Road Map Project districts use to assess students' risk of dropping out.

Box 1. Definitions of English learner student subgroups

Ever–English learner students are typically grouped into two categories: current and former English learner students.

Current English learner students have not yet achieved proficiency in English by grade 9. Current English learner students are further divided into two subgroups that reflect distinctions made in the research literature and correspond to practitioners' conceptualization of important differences among English learner students:

- *Newcomer English learner students (or "newcomers")* are recent immigrants who first entered a school in Washington state in grades 7, 8, or 9 and were still classified as current English learner students in grade 9.
- *Established English learner students* were first classified as English learner students in grade 6 or earlier and were still classified as English learner students in grade 9.

Former English learner students have achieved proficiency, as indicated by receiving a score at the highest level (level 4) on the state's English language proficiency assessment, which reclassifies them as former English learner students. Former English learner students are also divided into two subgroups:

- *Recently reclassified English learner students* are English learner students who reached proficiency and were reclassified as former English learner students in grade 7 or grade 8.
- *Long-term proficient English learner students* are English learner students who reached proficiency and were reclassified as former English learner students in or before grade 6.

The number of students in each group or subgroup for the six study districts combined are shown in the table. Detailed definitions and a description of how students are categorized into student groups and subgroups are in appendix A.

Sample size and characteristics of student groups and English learner student subgroups in six Washington state districts who entered grade 9 in 2008/09

Student group or subgroup	Number of students	Grade at entry into Washington state schools	Reclassified by grade 7	Reclassified by grade 9
All students	9,595	K–9	na	na
Never–English learner	6,943	K–9	na	na
Ever–English learner	2,652	K–9	Varies	Varies
Current English learner	1,333	na	na	na
Newcomer	604	7–9	na	No
Established	729	K–6	No	No
Former English learner	1,319	na	na	na
Recently reclassified	216	K–6	No	Yes
Long-term proficient	1,103	K–6	Yes	Yes

na is not applicable.

Source: Authors' analysis based on Washington Office of Superintendent of Public Instruction policies and data from six Road Map Project districts, 2004/05–2012/13.

Box 2. Data and methods

The Road Map Project school districts and the Washington Office of Superintendent of Public Instruction provided data for this study. The Washington Office of Superintendent of Public Instruction provided data from the Comprehensive Education Data and Research System for students enrolled in public schools from 2009/10 to 2012/13. It also provided data from the Transitional Bilingual Instructional Program database for English learner students from 2004/05 to 2012/13. Data included gender, race/ethnicity, grade level, English learner status for each school year, credits attempted, credits earned and in which subjects, as well as school and district enrollment and withdrawal dates and reasons. Six of the seven Road Map Project school districts provided additional data for the 2006/07–2008/09 school years. These data included the same variables that the Washington Office of Superintendent of Public Instruction provided for 2009/10–2012/13. Combining data from these sources provided up to eight years of data on a total of 9,595 students who started grade 9 in 2008/09 in the districts of Auburn, Federal Way, Kent, Renton, Tukwila, and the southern part of the Seattle Public Schools district.

Calculating graduation and dropout rates

Understanding how graduation and dropout rates vary provides helpful context because the two statistics are calculated differently. For each group of students defined in box 1, the study team calculated adjusted graduation rates four and five years after students entered grade 9. To calculate the adjusted four-year graduation rate, the number of graduates was divided by the number of incoming students in grade 9. Students with withdrawal codes of "transferred out" of Road Map Project districts were not included in the calculation of graduation or dropout rates. Students who transferred into Road Map Project districts after grade 9 were included in the calculations. Five-year graduation rates were calculated using the same formula and an additional year of enrollment records.

Dropout rates were calculated by dividing the number of students with withdrawal codes of "dropout" or "General Educational Development (GED)" at any time within four years of entering grade 9 by the number of incoming students in grade 9, correcting for the number of students transferring in or out of the Road Map Project school districts (the same denominator as that used to calculate the four-year graduation rate).

Assessing the accuracy of early warning indicators

The Road Map Project uses two early warning indicators: six or more absences in grade 9 plus at least one course failure in grade 9 (indicator 1) and at least one suspension or expulsion in grade 9 (indicator 2). Students are flagged as at risk if they trigger either indicator. Descriptive analyses compare how often students in different subgroups triggered the indicators.

To examine the accuracy of early warning indicators, logistic regression models were run for each indicator separately and for a composite indicator based on triggering either indicator or both indicators. Results from the logistic regression models were reported in odds ratios, which compare the odds (that is, the likelihood) that a group of students who triggered either one or both indicators will drop out, compared with the odds that a group of students who did not trigger either indicator will drop out. Results provide information about the likelihood that the indicators accurately predict dropping out. Models were run separately for all students, never–English learner students, and for each English learner student subgroup, allowing for a comparison of the likelihood—and therefore the accuracy—of the indicator for different groups of students.

Two indices are commonly used to describe the accuracy of dropout prediction (Jobs for the Future, 2014):

- *Precision* is the percentage of students who actually drop out among all students identified in grade 9 as at risk.
- *Sensitivity* is the percentage of students who were identified as at risk of dropping out and who actually drop out among all students who actually drop out.

The main report discusses the precision and sensitivity of the early warning indicators, as they directly pertain to the accurate prediction of dropouts. Additional information about other measures of accuracy is in appendix A.

Two research questions guided the study:

- How do the graduation and dropout rates of different subgroups of ever–English learner students compare with one another and with those of never–English learner students?
- Are two early warning indicators used to predict dropping out (six or more absences in grade 9 plus at least one course failure in grade 9, and at least one suspension or expulsion in grade 9) accurate and useful indicators for different groups of ever–English learner students compared with never–English learner students?

What the study found

This study found differences in graduation and dropout rates between ever– and never–English learner students and among subgroups of ever–English learner students. The study also found that ever–, never–, and subgroups of ever–English learner students varied in the rate at which they triggered the early warning indicators. Finally, the study found that the accuracy of indicators varied across subgroups of English learner students.

Students who had ever been English learners had graduation rates that were 9.5 percentage points lower and dropout rates that were 0.7 percentage point higher than those of students who had never been English learners

Graduation rates in the six study districts were lower than national averages. The four-year graduation rate in the study districts was 70.8 percent for all students entering grade 9 in 2008/09. On average, this rate was higher for never–English learner students (73.5 percent) than for ever–English learner students (64.0 percent; table 1). This graduation rate for never–English learner students is about 6.5 percentage points lower than the national average of 80 percent for never–English learner students for 2011/12. The national four-year graduation rate for ever–English learner students is not available, but the national rate for current English learner students in 2011/12 was 59 percent, which is also about 6 percentage points higher than the 52.7 percent rate for current English learner students in this study (U.S. Department of Education, 2014).

The four-year graduation rate in the study districts was higher for never–English learner students (73.5 percent) than for ever–English learner students (64.0 percent)

Five-year graduation rates are also useful to consider because for some English learner students an extra year provides the opportunity to improve their English proficiency and accumulate required credits for graduation. Other reasons students continue in high school for an additional year include needing extra time to complete an Individualized Education Program (for students receiving special education services), failing to meet graduation requirements because of shortcomings in student counseling, mismatch of credits transferred from one school with the graduation requirements of the new school, or difficult circumstances such as injury or illness that result in interrupted schooling. Never–English learner students had higher five-year graduation rates than ever–English learner students did, but the gap between the two narrowed from 9.5 percentage points after four years of high school to 5.6 percentage points after five years.

Because graduation rates do not provide adequate information about the outcomes for students who did not graduate after four years of high school, educators also pay attention to dropout rates. Some students who do not graduate in four years drop out, while others may continue in high school for another year. Although these students may benefit from services to help them graduate earlier, they might not benefit from the same interventions

Table 1. Number and percentage of students in six Washington state districts who graduated within four or five years of entering grade 9 in 2008/09, by English learner status

Student group or subgroup	Total number of students	Adjusted four year graduation rate		Adjusted five year graduation rate		Change, year 4 to year 5 (percentage points)
		Number	Percent	Number	Percent	
All students	9,595	6,796	70.8	7,410	77.2	6.4
Never–English learner	6,943	5,100	73.5	5,470	78.8	5.3
Ever–English learner	2,652	1,696	64.0	1,940	73.2	9.2
Current English learner	1,333	703	52.7	869	65.2	12.5
Newcomer	604	257	42.6	355	58.8	16.2
Established	729	446	61.2	514	70.5	9.3
Former English learner	1,319	993	75.3	1,071	81.2	5.9
Recently reclassified	216	150	69.4	165	76.4	7.0
Long-term proficient	1,103	843	76.4	906	82.1	5.7

Note: The adjusted four-year graduation rate is the number of graduates divided by the number of incoming students in grade 9, correcting for the number of students transferring in (included) or out (excluded) of the Road Map Project school districts. An additional year of enrollment records is included in the five-year adjusted graduation rate, which also excludes students who transfer out after the fourth year of high school (about 10 percent of all students who transfer out). See appendix A for details on the calculation of graduation rates.

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

used to prevent dropping out. Other students end their enrollment in school without a reason on record. Because their outcomes after their last year of high school are unknown, it is not certain whether dropout prevention interventions could help these students (after five years 12.1 percent of students had either missing, "unknown," or "no show" withdrawal codes; additional information about these students is in table 3 and appendix A). For example, it is possible that some of these students moved to another state and graduated there but that the transfer was never recorded in the database. A better way to describe the population of students who could benefit from dropout prevention interventions is to calculate dropout rates that distinguish the percentage of students who withdraw from school as a dropout and the percentage who earned a General Educational Development (GED) credential in place of a regular diploma.

After four years of high school the dropout rate for all students who entered grade 9 in 2008/09 in one of the six districts was 5.4 percent. Ever–English learner students dropped out at a higher rate (5.9 percent) than did never–English learner students (5.2 percent; table 2).

Certain subgroups of English learner students had considerably different graduation and dropout rates from those of other English learner students; relative to long-term proficient English learner students, newcomer English learner students' four-year graduation rates were 33.8 percentage points lower and their dropout rates were 5.8 percentage points higher

Graduation rates differed substantially among subgroups of ever–English learner students (see table 1). Slightly more than half (52.7 percent) of current English learner students graduated in four years. Within this group newcomers had a particularly low four-year graduation rate (42.6 percent). Former English learner students, in contrast, had a higher

Never–English learner students had higher five-year graduation rates than ever–English learner students did, but the gap between the two narrowed from 9.5 percentage points after four years of high school to 5.6 percentage points after five years

Table 2. Number and percentage of students in six Washington state districts who dropped out within four years of entering grade 9 in 2008/09, by English learner status

Student group or subgroup	Total number of students	Four year dropout rate	
		Number	Percent
All students	9,595	520	5.4
Never–English learner	6,943	364	5.2
Ever–English learner	2,652	156	5.9
Current English learner	1,333	103	7.7
Newcomer	604	54	8.9
Established	729	49	6.7
Former English learner	1,319	53	4.0
Recently reclassified	216	19	8.8
Long-term proficient	1,103	34	3.1

Note: Graduation rates in table 1 and dropout rates in this table do not sum to 100 percent because some students may have continued in high school for a fifth or sixth year, and some students had withdrawal codes that did not provide information on whether that student dropped out or transferred to another school outside the six districts and graduated elsewhere. Such students are included in the denominators of both graduation and dropout rates, but not in the numerators. Four- and five-year graduation rates and four-year dropout rates are calculated using the same denominator. Dropout rates were calculated by dividing the number of students with withdrawal codes of "dropout" or "General Educational Development (GED)" at any time within four years of entering grade 9 by the number of incoming students in grade 9, correcting for the number of students transferring in (included) or out (excluded) of the Road Map Project school districts. See appendix A on the calculation of dropout rates.

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

graduation rate. Within this group long-term English proficient students stood out as having the highest four-year graduation rate of all student groups (76.4 percent). Recently reclassified students graduated at a higher rate (69.4 percent) than did current English learner students but still trailed never–English learner students by 4.1 percentage points.

After five years the graduation rate for current English learner students remained lower than that of other groups; however, the percentage point increases in graduation rate from year 4 to year 5 were largest for these students. For example, the four-year graduation rate of newcomers was 30.9 percentage points lower than that of never–English learner students, whereas the five-year graduation rate for this group was 20.0 percentage points lower. Former English learner students also saw increased graduation rates after five years, although the increases were more in line with those of never–English learner students.

Dropout rates also differed substantially among subgroups of ever–English learner students (see table 2). Current English learner students were more likely to drop out than never– or former English learner students. Newcomers had the highest dropout rate of any group, at 8.9 percent. The difference between the two subgroups of former English learner students was particularly stark: 8.8 percent of recently reclassified students dropped out (a rate comparable with that of newcomers) compared with 3.1 percent of long-term proficient English learner students.

At the end of four years of high school 23.8 percent of all students had neither graduated nor dropped out (table 3). Of these students, 62.4 percent (1,422 of 2,279 students) enrolled in a fifth year of high school. The other 37.6 percent had unknown, missing, or no-show

After five years the graduation rate for current English learner students remained lower than that of other groups; however, the percentage point increases in graduation rate from year 4 to year 5 were largest for these students

Table 3. Number and percentage of students in six Washington state districts who neither graduated nor dropped out after four or five years of entering grade 9 in 2008/09, by English learner status

Student group or subgroup	Total number of students	Students who neither graduated nor dropped out after four years		Students who enrolled in a fifth year of high school		Students who neither graduated nor dropped out after five years	
		Number	Percent	Number	Percent	Number	Percent
All students	9,595	2,279	23.8	1,422	14.8	1,162	12.1
Never–English learner	6,943	1,479	21.3	863	12.4	775	11.2
Ever–English learner	2,652	800	30.2	559	21.1	387	14.6
Current English learner	1,333	527	39.5	380	28.5	253	19.0
Newcomer	604	293	48.5	196	32.5	144	23.8
Established	729	234	32.1	184	25.2	109	15.0
Former English learner	1,319	273	20.7	179	13.6	134	10.2
Recently reclassified	216	47	21.8	33	15.3	22	10.2
Long-term proficient	1,103	226	20.5	146	13.2	112	10.2

Note: Students who neither graduated nor dropped out include students who are continuing their high school education and students whose outcomes after four or five years of high school are unknown (withdrawal code of missing, "unknown," or "no show").

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

withdrawal codes and could not be categorized as graduates or dropouts. The proportion of students who had neither graduated nor dropped out before the fifth year of high school was higher among ever–English learner students (30.2 percent) than among never–English learner students (21.3 percent). Among ever–English learner students, newcomers had the highest proportion of students who had neither graduated nor dropped out (48.5 percent), while long-term proficient English learner students had the lowest (20.5 percent). However, gaps between groups diminished by the end of the fifth year of high school, when 23.8 percent of newcomers and 10.2 percent of long-term English proficient students had neither graduated nor dropped out (see table 3).

The Road Map Project early warning indicators were unable to accurately identify many future dropouts across the six districts, especially among newcomer English learner students

Determining the percentage of students who were flagged by indicator 1 (six or more absences plus at least one course failure in grade 9), indicator 2 (at least one suspension or expulsion in grade 9), or a composite (triggering either one or both indicators) provides useful context for understanding the accuracy of the indicators (table 4). Overall, 23.8 percent of students triggered one or both indicators, with ever–English learner students triggering them only slightly more than never–English learner students. Similar percentages of current (25.0 percent) and former English learner students (23.4 percent) triggered one or both indicators. These percentages are all substantially higher than the percentage of students who dropped out.

There were notable differences among English learner subgroups in the percentage of students who triggered the composite indicator. Among current English learner students, newcomers triggered either one or both indicators only 13.9 percent of the time, even though they had the highest percentage of dropouts. In contrast, 34.2 percent of

Overall, 23.8 percent of students triggered one or both early warning indicators, with ever–English learner students triggering them only slightly more than never–English learner students

Table 4. Percentage of students in six Washington state districts who triggered each early warning indicator, for all students and English learner student subgroups who entered grade 9 in 2008/09

Student group or subgroup	Triggered indicator 1 (six or more absences plus at least one course failure in grade 9)	Triggered indicator 2 (at least one suspension or expulsion in grade 9)	Triggered either one or both indicators (composite indicator)	Percentage of students who dropped out
All students	20.3	8.0	23.8	5.4
Never–English learner	20.1	8.1	23.6	5.2
Ever–English learner	20.7	8.0	24.2	5.9
Current English learner	21.1	8.3	25.0	7.7
Newcomer	11.4	4.5	13.9	8.9
Established	29.1	11.5	34.2	6.7
Former English learner	20.4	7.6	23.4	4.0
Recently reclassified	27.3	12.0	31.9	8.8
Long-term proficient	19.0	6.7	21.7	3.1

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

For all student groups it was more common to trigger early warning indicator 1 (six or more absences plus at least one course failure in grade 9) than early warning indicator 2 (at least one suspension or expulsion in grade 9)

established English learner students were flagged. Among former English learner students, 21.7 percent of long-term proficient students triggered either one or both indicators, compared with 31.9 percent of recently reclassified students.

For all student groups it was more common to trigger indicator 1 than indicator 2. The two groups with the highest rate of triggering any indicator—established and recently reclassified English learner students—were also the two groups that most often triggered indicator 2.

It is important to know not only what percentage of students the indicators flag, but also whether the indicators can distinguish between students who are likely to drop out and those who are not. One way to address this question is to look at odds ratios (table 5; see appendix A for a discussion of odds ratios). For example, among never–English learner students, an odds ratio of 3.2 means that the odds of dropping out for a never–English learner student who triggered an indicator were 3.2 times higher than the odds of dropping out for never–English learner students who did not trigger the indicator. The odds ratios were statistically significant for all groups and subgroups except for recently reclassified English learner students.

If an indicator had perfect precision, all students identified by that indicator in grade 9 would drop out. However, the precision was low for a composite indictor based on triggering either indicator or both indicators. Overall, only 10.3 percent of students who were identified dropped out (see table 5). The indicators were most precise for newcomers (15.5 percent) and least precise for long-term proficient English learner students (6.7 percent).

An indicator with perfect sensitivity would identify 100 percent of dropouts as being at risk when they were in grade 9. The sensitivity of the composite indicator (either indicator or both) was 45.0 percent for all students. This means that 55.0 percent of eventual dropouts

Table 5. Odds ratios, precision, and sensitivity of the composite dropout indicator for students in six Washington state districts who entered grade 9 in 2008/09, by English learner status

Student group or subgroup	Odds ratio	Precision (percentage of students identified in grade 9 as at risk who dropped out)	Sensitivity (percentage of dropouts identified in grade 9 as at risk)
All students	2.8***	10.3	45.0
Never–English learner	3.2***	10.7	48.1
Ever–English learner	2.0***	9.2	37.8
Current English learner	1.8**	11.1	35.9
Newcomer	2.1*	15.5	24.1
Established	1.9*	9.6	49.0
Former English learner	2.4**	7.1	41.5
Recently reclassified	1.0	8.7	31.6
Long-term proficient	3.4***	6.7	47.1

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

were not flagged by the indicators. Sensitivity was higher for never–English learner students (48.1 percent) than for ever–English learner students (37.8 percent). It was much lower for newcomers: only 24.1 percent of newcomer dropouts were correctly identified as at risk in grade 9. Sensitivity was highest for established English learner students (49.0 percent). For additional analyses of the accuracy of the indicators, see appendix B.

Implications of the study findings

Since passage of the No Child Left Behind Act of 2001, it has become common to consider the performance of current English learner students compared with that of non–English learner students, both in achievement on state assessments and in graduation rates. It is less common to examine findings for current and former English learner students separately. This study examined the graduation and dropout rates not only for current and former English learner students, but also for subgroups within each of those categories.

The study highlighted the much lower graduation rate for newcomers, compared not only with never–English learner students but also with established English learner students (other current English learner students who had first attended U.S. schools in grade 6 or earlier). The study found that the higher graduation rates of former English learner students were due to the particularly high graduation rates of long-term proficient students; recently reclassified students graduated at lower rates than never–English learner students. Within this sample of ever–English learner students, dropout rates were particularly high for newcomers and recently reclassified students. This underscores the utility of examining data for subgroups of English learner students separately. These findings may raise districts' awareness of subgroups of English learner students who may be in particular need of additional supports to graduate.

The data also reveal that while a fifth year of high school boosted graduation rates for all students, the gains from a fifth year were largest for current English learner students,

The higher graduation rates of former English learner students were due to the particularly high graduation rates of long-term proficient students; recently reclassified students graduated at lower rates than never–English learner students

particularly for newcomers. Providing the opportunity for a fifth year—and making a fifth year appealing and feasible to students—may be one way to support newcomers.

The purpose of early warning indicators is to systematically identify students in grade 9 who are at risk of dropping out, so that they can receive additional supports to improve their chances of graduating. However, selecting the best indicators can be challenging since tradeoffs need to be considered. A useful indicator is one that is precise enough not to flag too many students who would have graduated without additional supports, yet sensitive enough to identify a substantial percentage of students who need additional interventions to avoid dropping out.

One recent guide recommends that districts examine multiple indicators and select those with at least 50 percent precision and preferably closer to 67 percent (Jobs for the Future, 2014). Ideally, the indicator would also be sensitive enough to identify at least 50 percent of eventual dropouts as being at risk in grade 9. However, because the most precise indicators are often the least sensitive, districts must make choices based on available resources and the number of students they hope to identify and serve.

A review of early warning indicators summarized the precision and sensitivity of 110 dropout indicators used in different settings over the past 30 years and revealed vast variation in precision and sensitivity (Bowers, Sprott, & Taff, 2013). Precision was at least 50 percent for 35 of the 110 indicators (32 percent). Sensitivity was also at least 50 percent for 13 of those 35 indicators. In other words, only 12 percent of the 110 indicators met the recommendations of the guide (Jobs for the Future, 2014). However, only 7 indicators (6 percent) had precision as low as that of the Road Map Project indicators (only 10.3 percent of all identified students dropped out). Of the 110 studies reviewed, 47 (43 percent) had sensitivity values above 45 percent—the sensitivity of the Road Map Project composite indicator. Given that there were many examples with better precision and sensitivity, it seems likely that the Road Map Project could identify stronger indicators than those currently being used.

Given that there are many examples of early warning indicators with better precision and sensitivity, it seems likely that the Road Map Project could identify stronger indicators than those currently being used

Further research using data from the Road Map Project districts might identify other promising variables or cutpoints. For example, many early warning indicators use a high number of absences as an indicator (Bruce, Bridgeland, Fox, & Balfanz, 2011). Increasing the number of absences in indicator 1 might improve its precision, although it might also reduce its sensitivity. Some districts also use transitions—such as moving into a district after grade 5 or making multiple moves in and out of the district—in their early warning indicators (Hauser & Koenig, 2011). Academic achievement, grade retention, and course performance in grade 9 may also be better indicators of dropout risk for English learner students (Gwynne, Pareja, Ehrlich, & Allensworth, 2012; Kim, 2011).

Indicators also perform differently for different subgroups of ever–English learner students (Gwynne et al., 2012). Most troublesome, they flag few newcomers—the subgroup that is most at risk of dropping out. This could be because of the unique circumstances of newcomers, such as difficulty learning English quickly enough to be able to earn high school credits in content areas required for graduation, enrollment in electives rather than in core courses, or the interruption of their education because of war or time in refugee camps (Kanno, 2015). At the same time, the indicators identified many students from the other subgroups as at risk who were not actually at risk of dropping out.

Because the risk of dropping out is especially high for newcomers, and yet the indicators are least sensitive for these students, other schools and districts serving newcomers may want to examine the accuracy of their own indicators for this subgroup of students. If they also find that the sensitivity of the indicators is low, they may want to consider other ways of looking at the academic records of this group. For example, many districts use credit accumulation to monitor whether students are on track to graduate or at risk of dropping out. Schools and districts serving newcomer English learner students, in particular, may want to review the programs or supports they have in place to assist these students and to increase their graduation rates.

As student characteristics, instruction methods, and interventions change over time, the ability of indicators to correctly identify students who need additional services may also change

Ultimately, the Road Map Project districts and other state and local education agencies and communities that use early warning indicators may want to regularly evaluate the accuracy of their indicators. As student characteristics, instruction methods, and interventions change over time, the ability of indicators to correctly identify students who need additional services may also change.

Limitations of the study

The findings of this study should be interpreted with caution because of limitations in the state and district data used in the analyses. First, there were challenges in accurately identifying some long-term proficient English learner students. Having incomplete data for English learner status before 2004/05 means that, for some students, it was not clear whether they had been English learner students before grade 4, which would put them in the long-term proficient subgroup. To better capture students in this subgroup, the study coded as long-term proficient all students with a primary language other than English or who spoke a language other than English at home. This allowed the identification of students who were likely to be English learner students, but it may have included a few students who were bilingual but so fully proficient in English by the time they entered school that they were never classified as English learner students.

Second, the English learner status of students who transferred into a Road Map Project district after grade 9 was difficult to determine. Students who listed a home or primary language other than English who were not classified as English learners were categorized as long-term proficient English learner students even though they might have been recently reclassified. A few students transferring into Road Map Project districts after grade 9 (that is, students who were present in grade 8 or earlier but not in grade 9) could be categorized as established or recently reclassified English learner students. Less than 3 percent of students categorized as established or recently reclassified English learner students had transferred into a Road Map Project district after grade 9, compared with 36.4 percent of students categorized as newcomers, 10.8 percent of long-term proficient English learner students, and 10.8 percent of never–English learner students.

Third, it was not possible to identify the graduation or dropout status for all students in the dataset. Specifically, 12.1 percent of students in the sample had a final withdrawal code that was missing, "unknown," or "no show" after five years of high school. These students are included in the denominator for calculating graduation and dropout rates but not in the numerator because it could not be confirmed whether they graduated, continued in school, or dropped out.

Finally, although the data for the study came from a school year before the indicators were adopted for use across multiple districts and before the districts had formal early warning systems, it is possible that some struggling students who would have been flagged by an indicator received supportive interventions from their schools. If that were the case, and the interventions were effective, some flagged students who might have dropped out would instead have graduated. This could contribute to the finding that substantially more students triggered an indicator than dropped out. Having data on the specific interventions students received might help explain the overall low precision of the indicators and add useful evidence for school and district leaders to think about when designing and improving early warning systems.

Appendix A. Data and methodology

This appendix defines key variables used in the study in greater detail and explains the analytic methods that were employed to produce the study's results.

Defining subgroups of English learner students

Federal law requires that students who arrive at school speaking a home language other than English be tested to determine their level of proficiency in English. If students are not proficient, they are classified as current English learner students. Once a year, their proficiency is reassessed. Depending on assessment results and local requirements, students remain classified as current English learner students or are reclassified as former English learner students.

This process is similar across the United States, but the requirements for reclassification vary in different states. In Washington state English learner classification is determined solely by an English learner student's score on a single language assessment: the Washington Language Proficiency Test until 2011/12 and the Washington English Language Proficiency Assessment starting in 2012/13. Both assessments tested students' listening, speaking, reading, and writing in English. Both assessments also required students to score at level 4 (the highest level) overall to be reclassified as former English learner students. Students with an overall score of level 3 or below were categorized as current English learner students. English learner students continued to take a language proficiency assessment annually until reclassification. Once reclassified, former English learner students no longer took that assessment and could not be moved back into the group of current English learner students.

Given the heterogeneity of English learner students, it can be challenging to determine the appropriate way to disaggregate them into subgroups. Sometimes home language or immigrant/U.S. born are the most relevant categories; ultimately, any categorization scheme must depend on the purpose of a given study. A prior study of early warning indicators and English learner students in Chicago influenced the definition of English learner student subgroups in this work (Gwynne et al., 2012). In that study, researchers identified grade 9 students as current or former English learner students and distinguished within those two groups between students who had been in those categories before grade 6 and those who had not. In this study of the Road Map Project districts, the structure and reliability of existing data altered the definitions of these categories somewhat.

The four subgroups of ever–English learner students are described in the main report. This appendix provides additional details about the categorization of students—first for those who entered grade 9 in a Road Map Project district and then for those who transferred into a Road Map Project high school during grades 10–12—and some limitations of the data used for the study.

For this study, current English learner students (in grade 9) are subdivided into two subgroups: newcomers and established English learner students.

- *Newcomer English learner students* first enrolled in any Washington state school as an English learner student in grades 7, 8, or 9. Although most of these students were new arrivals from other countries, it is possible that some students had spent

time in another state before arriving in Washington state, and a few might have been born in the United States. For example, a Mexican-American child might have been born in Idaho and moved to Washington state in grade 7 but still be classified as an English learner student. The data provided no way to distinguish this child from a child who was born in Mexico and arrived in the United States, in Washington state, in grade 7. Therefore, it is possible that some students categorized as newcomers could have been established English learner students in another state. Nonetheless, all English learner students who arrived in Washington state in grades 7, 8, or 9 are defined as newcomers in this study with the understanding that this might include some established English learner students who had arrived earlier in another state.

- *Established English learner students* were those who were current English learner students in grade 6 and were still current English learner students in grade 9. Some of these students may have arrived in grades K–4 as English learner students, so that grade 9 could represent their sixth, seventh, eighth, ninth, or tenth year as a current English learner student. These students are often referred to as long-term English learner students in the research literature, which typically refers to students who have been classified as English learners for more than five years (for example, Kim & Herman, 2009).

There are also two distinct subgroups of former English learner students (those who had been classified as English learner students but were later reclassified as English proficient):

- *Recently reclassified students* were classified as current English learner students at the start of grade 7 but were reclassified as former English learner students by the start of grade 9.

- *Long-term proficient students* were reclassified as former English learner students in grade 6 or earlier. This long-term proficient group is an imperfect category. An ever–English learner student in grade 9 in 2008/09 would have needed to attain proficiency in English by 2005/06 to be considered long-term proficient. Data on the English learner status of students who were reclassified prior to 2004/05 were largely unavailable. To best estimate the number of students in this category, the study team included all students whose parents indicated that they had a primary language other than English or who themselves spoke a language other than English in the home. This may include a few never–English learner students who were bilingual from the time they started kindergarten. Relying solely on data codes for English learner status from 2004/05 would mean losing all former English learner students who were reclassified between kindergarten and grade 4. Given recent findings that English learner students are reclassified in 3.8 years on average, it made more sense to find a way to include the many students who are reclassified in grades 2, 3, and 4 in the analyses, even if it meant including a few never–English learner students who were either bilingual or whose parents spoke another language at home but did not teach it to their children (Greenberg Motamedi, 2015). To ensure the validity of this method, the study team checked the overlap between the two groups for later years that have more complete data and found that approximately 94 percent of students identified by their home language or their parents' primary language were also English learner students in the primary grades.

Determining graduation and dropout rates

Students were considered four-year graduates if their file included a code for graduating with a regular high school diploma, an associate's degree, or with an Individualized Education Program completion diploma (modified diploma) in four or fewer years after entering grade 9. To calculate the adjusted graduation rate, the number of graduates was divided by the number of incoming students in grade 9, correcting for the number of students transferring in or out of the six Road Map Project districts, using the following formula:

$$Graduation\ Rate = \frac{\#\ of\ students\ who\ graduated\ within\ four\ years\ of\ entering\ grade\ 9}{\#\ of\ students\ entering\ grade\ 9\ in\ 2008/09 + transfers\ in - transfers\ out}$$

Adding in the number of students earning a diploma, associate's degree, or modified diploma within five years of starting high school permitted the calculation of five-year graduation rates.

Similarly, Washington state's Office of Superintendent of Public Instruction uses the following formula to calculate four-year adjusted cohort dropout rates, or the percentage of students in any grade 9 high school class who drop out within four years of entering grade 9:

$$Dropout\ Rate = \frac{\#\ of\ students\ who\ dropped\ out\ within\ four\ years\ of\ entering\ grade\ 9}{\#\ of\ students\ entering\ grade\ 9\ in\ 2008/09 + transfers\ in - transfers\ out}$$

The number of students who dropped out includes students with withdrawal codes of "dropout" or "General Educational Development (GED)" for the final year they were in the dataset.

The denominators for four- and five-year graduation rates and for dropout rate are the same. Students who transferred out of the six Road Map Project districts at any point after grade 9 are neither included in the study sample nor in the denominators for calculating graduation and dropout rates.

Students who did not have a withdrawal code that indicated they dropped out or graduated were handled in the following ways:
- Students who transferred out of the Road Map Project districts after entering grade 9 (1,849 students or 16.1 percent of students who entered grade 9 in 2008/09) were not included in the calculation of graduation and dropout rates or in the study sample. About 10 percent of these students who transferred out of the Road Map Project districts did so after their fourth year of high school. Students who transferred out are not included in the study sample or in the calculation of graduation and dropout rates because the Road Map Project districts do not have influence over these students' outcomes after four or five years of high school after they leave.
- Students who did not live to graduate within five years—less than 0.1 percent of the sample of students who entered grade 9 in 2008/09—were not included in the calculation of graduation and dropout rates or in the study sample.
- Students whose last withdrawal code was "unknown" or "no show" (845 students or 8.8 percent of students in the study sample) are included in the study sample and in denominators of both equations, but they are not included in the numerators

of either equation. An additional 3.3 percent of students in the study sample (317 students) have a missing final withdrawal code. Some of these students may have continued their education in the following year, for which data were not available (45.4 percent of students missing the last withdrawal code were enrolled in 2012/13). Because it cannot be determined whether students who have withdrawal codes that are missing, "unknown," or "no show" in the last year they were present in the data graduated, dropped out, transferred, or died, they are included in the sample but considered neither graduates nor dropouts.

The graduation and dropout formulas yielded the percentages reported in tables 1 and 2 in the main report.

Defining course failures

Students were considered to have a course failure in grade 9 if any course they enrolled in had a grade of F, E, unsatisfactory, no pass, no credit, or an incomplete that was never replaced by a passing grade. Grade notations of withdraw, in progress (but never resolved as a grade), and N/A were not coded as course failures.

Note that the indicators for the Road Map Project include failures in any course subject, including electives. This differs from early warning indicators in some other settings, such as Chicago, where only failures in core subject areas are used to flag a student as at risk (Allensworth & Easton, 2007).

Analyzing the accuracy of early warning indicators

The logistic regression model and corresponding predictive probabilities were used to understand the ability of the two Road Map Project early warning indicators to accurately predict the probability of dropout. This approach has been employed previously to examine whether widely used indicators of risk are effective predictors of students likely to drop out and which indicators are most predictive (Allensworth & Easton 2007; Balfanz, Wang, & Byrnes, 2010; Gleason & Dynarski, 2002).

The model can be expressed as:

$$\ln[p/(1-p)]_i = \beta_0 + \beta_1 INDICATOR_i + \varepsilon_i$$

where ln is the natural logarithm, log_{exp}, where exp = 2.71828…, p is the probability that the event of dropout occurs, $p(dropout = 1)$, $p/(1-p)$ is the "odds" and $ln[p/(1-p)$ is the log odds, or "logit." The model was estimated separately for indicator 1, indicator 2, and a composite indicator (triggering either one or both indicators). Each model was estimated separately for each English learner student subgroup and for never–English learner students. In the indicator 1 model the dichotomous dependent variable equals 1 if the student dropped out and 0 if the student did not drop out. The independent variable $INDICATOR$ is 1 if a student has six or more absences plus at least one course failure in grade 9 and 0 otherwise. Similarly, for the indicator 2 model the independent variable $INDICATOR$ is 1 if a student has a suspension or expulsion in grade 9 and 0 otherwise. In a third set of analyses the independent variable $INDICATOR$ is 1 if a student met the criteria for triggering either one or both indicators and was 0 otherwise.

Stata, the statistical software used for analysis, produces several indices of classification accuracy to evaluate results from logistic regressions upon running a postestimation command "estat classification." In this study, the students are categorized into one of the four categories (table A1).

Once students are grouped into one of the four categories, it becomes possible to calculate four indices. The first index, precision, is the percentage of students who drop out among all students who are identified as at risk of dropping out by the indicator—or the number of true positives divided by the sum of true positives and false positives ($A/[A+B]$). To a certain degree, precision is the accuracy of the early warning flag. However, if schools use the early warning flag to provide helpful interventions to students, fewer flagged students may drop out, which would reduce precision. Higher precision implies the indicator was able to minimize false positives—that is, not overidentify students so that students not at risk of dropping out do not have to undergo interventions.

The second index, sensitivity, is the percentage of students who are identified as at risk of dropping out among all students who drop out—or the number of true positives divided by the sum of true positives and false negatives ($A/[A+C]$). It provides information about how well the early warning indicators identify dropouts.

The third index, specificity, is the percentage of students who are identified as not at risk of dropping out among all students who do not drop out—or the number of true negatives divided by the sum of true negatives and false positives ($D/[D+B]$). This provides information about the percentage of students who did not trigger early warning indicators who were genuinely not at risk.

Finally, some researchers also consider negative predictive power, the percentage of students who do not drop out among all students who are identified as at risk by the indicator. This can be calculated as the number of true negatives divided by the sum of false negatives and true negatives ($D/[C+D]$). High negative predictive power implies the indicator was able to minimize false negatives—that is, it avoids under-identifying students so that more students truly at risk of dropping out can receive timely interventions.

Table A1. Example of classification of results from logistic regression

Prediction based on indicators	Actual outcome	
	Dropped out	**Did not drop out**
At risk	A. Accurate: True positive	B. Inaccurate: False positive
Not at risk	C. Inaccurate: False negative	D. Accurate: True negative

Source: Authors' illustration.

Appendix B. Supplemental results

This appendix provides more detail about the strength and significance, as well as the precision, sensitivity, specificity, and negative predictive power of the early warning indicators used across the Road Map Project districts.

Odds ratios provide information about the likelihood of an outcome occurring for one group compared with another. Logistic regression generated the odds ratios displayed in table B1. The regression model was estimated separately for indicator 1, indicator 2, and a composite indicator (triggering either indicator or both indicators). Furthermore, models were estimated separately for all students, never–English learner students, and each English learner student subgroup.

The statistical significance of some odds ratios in table B1 means that triggering an indicator yields statistically different odds of dropping out. For example, among never–English learner students, those who triggered indicator 1 in grade 9 were statistically significantly more likely to drop out than those who did not. The odds ratio of 3.0 means that the odds of dropping out for never–English learner students who triggered indicator 1 were 3.0 times higher than the odds of dropping out for never–English learner students who did not trigger the indicator.

The odds ratio was higher on average for indicator 2 than for indicator 1 or for the composite indicator (triggering one indicator or both). However, the composite indicator was statistically significant more often than either indicator on its own.

The analysis software, Stata, generated indices of classification accuracy for the logistic regression results: precision, sensitivity, specificity, and negative predictive power.

Precision. The precision of indicator 1 for never–English learner students was 10.7 percent and for ever–English learner students 8.7 percent (table B2). There was variation among

Table B1. Odds ratios for early warning indicators as predictors of dropping out for students from six Washington state districts who entered grade 9 in 2008/09, by English learner status

Student group or subgroup	Indicator 1 (six or more absences plus at least one course failure in grade 9)	Indicator 2 (at least one suspension or expulsion in grade 9)	Composite indicator (triggering either one or both indicators)
All students	2.6***	2.9***	2.8***
Never–English learner	3.0***	3.3***	3.2***
Ever–English learner	2.1**	2.0**	2.0***
Current English learner	1.6*	1.5	1.8**
Newcomer	1.6	2.4	2.1*
Established	1.9*	1.3	1.9*
Former English learner	2.1**	3.5***	2.4**
Recently reclassified	0.9	0.8	1.0
Long-term proficient	2.7**	5.6***	3.4***

* Significant at *p* < .05; ** significant at *p* < .01; *** significant at *p* <.001.

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

Table B2. Summary of classification accuracy results by indicator and overall for students from six Washington state districts who entered grade 9 in 2008/09, by English learner status

Student group or subgroup	Precision (percentage of students identified in grade 9 as at risk of dropping out who did drop out)	Sensitivity (percentage of students who dropped out who were identified in grade 9 as at risk of dropping out)	Specificity (percentage of students who did not drop out who were identified in grade 9 as not at risk of dropping out)	Negative predictive power (percentage of students identified in grade 9 as not at risk of dropping out who did not drop out)	Correctly classified (percentage of students who were correctly classified as at risk or not at risk of dropping out)
Indicator 1: Six or more absences plus at least one course failure in grade 9					
All students	10.1	37.9	80.8	95.8	78.4
Never–English learner	10.7	40.9	81.1	96.1	79.0
Ever–English learner	8.7	30.8	79.9	94.9	77.0
Current English learner	10.7	29.1	79.6	93.1	75.7
Newcomer	13.0	16.7	89.1	91.6	82.6
Established	9.9	42.9	71.9	94.6	70.0
Former English learner	6.7	34.0	80.2	96.7	78.3
Recently reclassified	8.9	26.3	72.6	91.1	68.5
Long-term proficient	6.2	38.2	81.6	97.6	80.2
Indicator 2: At least one suspension or expulsion in grade 9					
All students	12.7	18.8	92.6	95.2	88.6
Never–English learner	13.4	20.6	92.6	95.5	88.9
Ever–English learner	10.9	14.7	92.5	94.6	87.9
Current English learner	10.8	11.7	92.0	92.6	85.7
Newcomer	18.5	9.3	96.0	91.5	88.2
Established	8.3	14.3	88.7	93.5	83.7
Former English learner	11.0	20.8	93.0	96.6	90.1
Recently reclassified	7.7	10.5	87.8	91.1	81.0
Long-term proficient	12.2	26.5	93.9	97.6	91.8
Composite indicator (triggering either one or both indicators)					
All students	10.3	45.0	77.5	96.1	75.7
Never–English learner	10.7	48.1	77.8	96.4	76.2
Ever–English learner	9.2	37.8	76.7	95.2	74.4
Current English learner	11.1	35.9	75.9	93.4	72.8
Newcomer	15.5	24.1	87.1	92.1	81.5
Established	9.6	49.0	66.9	94.8	65.7
Former English learner	7.1	41.5	77.4	96.9	76.0
Recently reclassified	8.7	31.6	68.0	91.2	64.8
Long-term proficient	6.7	47.1	79.1	97.9	78.2

Source: Authors' analysis of Washington Office of Superintendent of Public Instruction and Road Map Project district data, 2004/05–2012/13.

English learner subgroups, with long-term proficient English learner students having the lowest precision for indicator 1 (6.2 percent) and newcomers the highest (13.0 percent).

Patterns in the precision of indicator 2 were somewhat similar: There was a 2.5 percentage point difference between never– (13.4 percent) and ever–English learner students (10.9 percent) and the precision of indicator 2 was highest for newcomers (18.5 percent). However, for this indicator, the lowest level of precision was for recently reclassified English learner students (7.7 percent).

The precision for the composite indicator ranged from a low of 6.7 percent for long-term proficient English learner students to a high of 15.5 percent for newcomers. This means that the indicators accurately flagged future dropouts between 6.7 and 15.5 percent of the time. Precision did not increase for the composite indicator. Indicator 2 alone had slightly better precision than the composite indicator for all subgroups except for established and recently reclassified English learner students. Of course, precision statistics cannot reveal whether having been flagged and receiving interventions prevented some potential dropouts from dropping out.

Sensitivity. Overall, the use of indicator 1 in grade 9 correctly identified 37.9 percent of all eventual dropouts, but the proportion was higher for never–English learner students (40.9 percent) than for ever–English learner students (30.8 percent). The sensitivity of indicator 1 looked very different for the subgroups of ever–English learner students: as low as 16.7 percent of newcomers and as high as 42.9 percent of established English learner students. For indicator 2, a generally similar pattern in sensitivity was evident: it was higher for never–English learner students (20.6 percent) than for ever–English learner students (14.7 percent), and there was substantial variation among English learner subgroups. The sensitivity of indicator 2 was lowest for newcomers (9.3 percent) and highest in this case for long-term proficient students (26.5 percent).

When the composite indicator (triggering either indicator or both) was used, sensitivity increased by about 5 to 9 percentage points compared with indicator 1 alone and substantially more compared with indicator 2. The general patterns observed with indicator 1 are also evident for the composite indicator: Sensitivity is higher for never–English learner students than for ever–English learner students. Among subgroups, sensitivity is lowest for newcomers (24.1 percent) and highest for established English learner students (49.0 percent). This means that the indicators failed to identify more than half of all eventual dropouts, from any subgroup, and missed 75.9 percent of newcomers who dropped out.

Precision and sensitivity are useful ways of examining how well indicators identify students who will later drop out. At the same time, districts want to ensure that they are accurate in identifying students who will not drop out. They do not want to inaccurately flag these students as being at risk and provide expensive interventions if the students are not at risk, and yet they also want to avoid incorrectly identifying them as not at risk when in fact they later drop out. These concerns are addressed by examining specificity and negative predictive power.

Specificity. Most students neither triggered an indicator nor dropped out. Some 23.8 percent of students triggered an indicator, meaning 76.2 did not (see table 4 in the main report). Similarly, 5.4 percent of students dropped out, meaning 94.6 percent did not drop out (see table 2 in the main report). For that reason, specificity values—which provide information on the accurate identification of nondropouts—were much higher than precision or sensitivity values.

It is easier to identify the many students who are not at risk. These values were similar for never– and ever–English learner students for indicator 1, indicator 2, and for the composite indicator. For example, for the composite indicator the rates are 77.8 percent for never–English learner students and 76.7 percent for ever–English learner students. Within subgroups, specificity was lowest for established and recently reclassified English learner students.

Negative predictive power. Of all the students identified as not at risk of dropping out using the composite indicator, 96.1 percent did not drop out. Although negative predictive power was lowest for newcomer and recently reclassified English learner students, it remained high (92.1 and 91.2 percent, respectively). Similar patterns held for indicator 1 and indicator 2.

Finally, combining precision and negative predictive power yields the percentage of students who were correctly classified: 75.7 percent all students, using the composite indicator, but only 64.8 percent of recently reclassified English learner students. While the percent correctly classified can be used as an overall summary measure of accuracy, it does not facilitate decisionmaking as accurately as the separate indicators—such as precision and sensitivity—because those indicators allow policymakers to consider the tradeoffs involved in making false positives and false negatives. For this reason, the percentage of students correctly classified is not discussed in the main report.

Using the composite indicator improves the percentage of dropouts flagged by the early warning system (sensitivity) but it lowers specificity. Weighing higher sensitivity over higher specificity essentially means accepting the mistaken identification of some students as at risk who are not really at risk, in exchange for also identifying more students genuinely at risk. This would be the argument for using the composite indicator rather than only one indicator.

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