EARLY WARNING INDICATORS AND SEGMENTATION ANALYSIS

A TECHNICAL GUIDE ON DATA STUDIES THAT INFORM DROPOUT PREVENTION AND RECOVERY

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Early Warning Indicators and Segmentation Analysis: A Technical Guide on Data Studies That Inform Dropout Prevention and Recovery

Prepared by Jobs for the Future

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INTRODUCTION

Nationally, more than one million youth drop out of high school each year. One in four young people do not graduate with their age mates (Civic Enterprises et al. 2012). Thus, in recent years, national leaders have directed sustained attention to what they term the "dropout crisis," particularly in high schools that are graduating less than two-thirds of their students. The U.S. Department of Education has responded by requiring more transparency about graduation rates and providing unprecedented support to address this crisis through programs such as School Improvement Grants and the High School Graduation Initiative.[1]

With recognition growing that improving graduation rates is key to our country's economic and civic success, states and local communities have also responded to the dropout crisis. Many districts have taken concerted action to support students who are struggling in school and to recover young people who have dropped out. Key to the success of these efforts is the creation of early warning systems. These systems are based on breakthroughs in understanding the types of data analysis that can guide districts and schools to systematically identify youth who are struggling or have fallen off track and to put in place support systems and accelerated programs that help these young people get back on track and succeed in school.

The work of building strong early warning systems, which has begun to yield compelling results, shows us that dropping out is not an intractable problem. In fact, that work provides strong evidence that local and state education agencies can make significant progress when they identify students in need of supports early, i.e. in 9th grade or before, and implement a range of whole school improvements, targeted interventions, and specific programs that better address the needs of struggling students and put them back on a path to graduation. Systemic dropout prevention efforts suggest promising results-- as over recent years our nation's graduation rates have increased by three and a half percentage points between 2001 and 2009 (Civic Enterprises et al. 2012). But much more work is required to ensure that many more young people complete high school with skills to enter postsecondary education and compete in our high-skilled economy.

Along with early warning indicators, another important type of data study is segmentation analysis. This study involves looking at data on current high school students who are significantly off track for graduation and using that information to plan appropriate recovery programming for specific groups of students (e.g., those far off track to graduation but still in school). While early warning indicators focus on dropout prevention, segmentation studies help

[1] See: http://www2.ed.gov/programs/dropout/index.html

districts assess the numbers of youth who are off track for graduation (and by how much) and inform the growth of appropriate recovery programming.

For many districts (including recipients of High School Graduation Initiative grants and others), early warning systems are central to dropout prevention efforts—catching students before they drop out. For those frontrunner districts that have begun to conduct and use segmentation studies, the two systems operating together can have a significant impact on raising graduation rates.

With this growing evidence in hand, the Everyone Graduates Center and Jobs for the Future, with the U.S. Department of Education, have developed this resource guide for states and school districts to help them establish early warning indicators of high school dropout and launch segmentation analysis. The goal is to encourage more states and school districts to develop and scale up early warning systems, segmentation studies, and related supports, as well as to offer direction and advice in developing these data-driven, resource-efficient systems.

We know from experience with frontrunner districts that this work can result in more responsive school environments, more individualized and timely supports, and more effective recovery programming. We trust that the information contained in the guide will be useful to the districts as they take on and deepen their work, and we welcome feedback on the usefulness of the guide in achieving these aims.

WHAT'S IN THIS GUIDE?

Early warning systems begin with indicators that predict high school dropout. Establishing a set of indicators provides a powerful tool at the K-12 level that can alert educators to students who need intervention to stay on track to graduation. Good indicators have a number of key characteristics:

- Based on evidence and research from school districts and states;
- Include a limited set of data points that are readily available to school districts (and easy to collect and report);
- Effective at predicting which students are likely to dropout; and
- Efficient at avoiding the identification of students who would graduate without supplemental intervention.

Many school districts and states are now implementing systems that take administrative data (e.g., attendance, course grades, and discipline), turn them into early warning indicators, and generate reports for school staff, listing those students most at risk of dropping out or failing to

graduate. A few leading districts are combining early warning systems with segmentation studies. Segmentation studies use data on student age and credits earned to identify students who are significantly off track to high school graduation and unlikely to graduate without an alternative option. Such data can prove a powerful tool in planning and designing recovery programming.

This technical resource guide leads school districts and their staff (at both administrative and school levels) through the technical steps involved in establishing an early warning system and conducting a segmentation study. The guide is organized into seven sections.

- **Section 1** provides basic background on early warning systems for staff at all levels, the research behind these systems, their uses, and the reasons why a school district would set their development as a key goal for its staff and schools.

- **Section 2** is intended primarily for a school district's department of research, assessment, and evaluation. It specifies the type of data needed to establish an early warning system, as well as the simple descriptive ways to analyze the data to determine a set of early warning indicators.

- **Section 3** discusses the types of reporting that are essential to an early warning system. It provides detail on how district-level data can be captured in user-friendly reports for school-level staff who work directly with students. This section is particularly intended for use by the district's technology and information department that generates the reports electronically from databases.

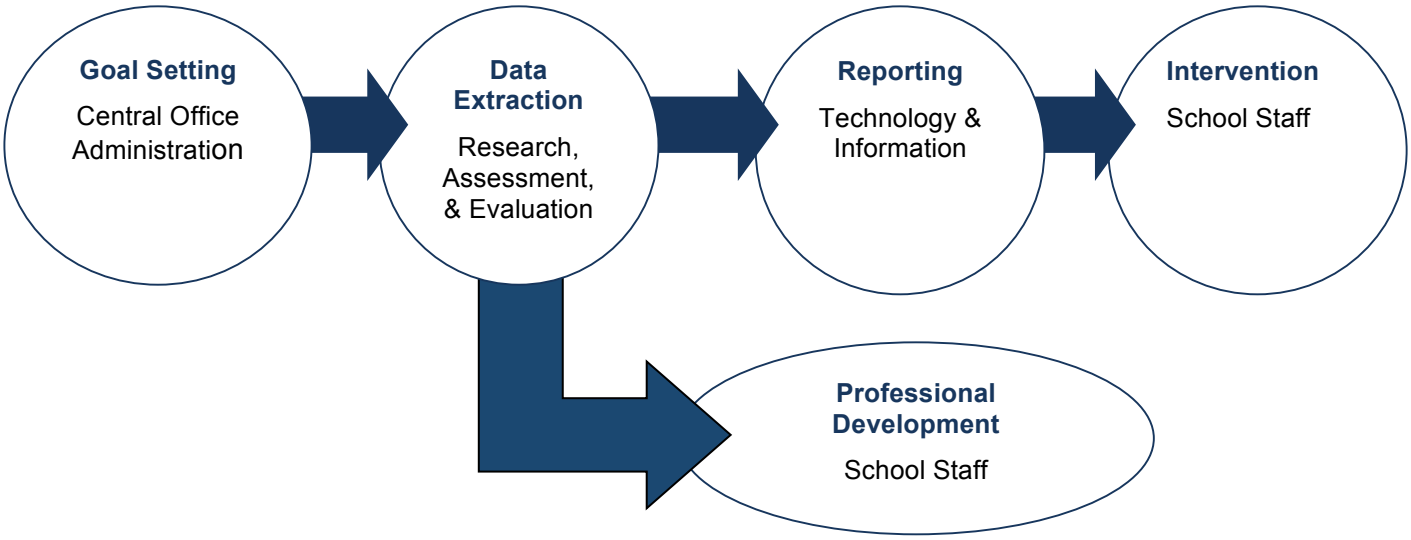
- **Section 4** provides practical examples from school districts that developed and implemented early warning systems. It also suggests some solutions to the most common roadblocks that districts encounter at each stage of developing an early warning system

- **Section 5** walks districts through the rationale for and steps to conduct a segmentation study.

- **Appendix A** provides some information on additional resources that can help to guide a district with the steps needed to develop an early warning system, first ensuring effective use of information at the school level and then organizing staff and services to fashion a system of effective interventions. Additional resources listed here provide guidance on achieving staff buy-in, providing professional development, building an intervention team and selecting appropriate interventions for identified students. This information is relevant for both district-office and school-based staff.

Each step involved in developing an early warning system (and doing segmentation study) may be directed by different departments or staff within a district *(see figure)*. Yet while each section of the guide is directed to staff with key responsibilities for the particular areas of work, it is worthwhile for all involved staff to understand what developing an early warning system will entail for their district, the different tasks needed to set up the system, and the operational roles of the various departments. While a central administration office may initiate the process by setting the goal for the district, the active support of all parties is needed to make the development and use of the early warning system a high priority within the district. Similarly, it is school-level staff who ultimately put the reports created by an early warning system into practical use and work with students directly, so they must understand and buy into the development of the system and give input throughout the process. It is essential that all involved departments and stakeholders are represented in planning meetings from the initial startup.

Flow Chart for Developing an Early Warning System: Who's Involved



1. OVERVIEW OF EARLY WARNING SYSTEMS

Over the past decade, several developments have merged to give educators and their partners both an interest in addressing high dropout rates and the ability to reduce them significantly. First, alarmingly low graduation rates in many high schools and districts throughout the nation sparked a surge in interest on the part of communities, educational organizations, and government organizations at all levels in finding better and more intentional ways to stem the numbers of young people leaving high school without a credential. Concurrently, research has demonstrated that high school dropouts can be identified early, long before they fall off the path to graduation (Allensworth & Easton 2007; Balfanz & Herzog 2007; Neild & Balfanz 2006). Using just a few key, readily available data points, school districts and staff can identify those students who are most likely to drop out. Combined with a third development—the continued improvement of student information systems and databases by school districts and states—we can now use such data to create and implement early warning systems that address the dropout crisis much more effectively. According to the National Governors Association, at least sixteen states and an ever growing number of school districts now use some form of early warning tool to predict, as early as middle school, the students likely to struggle to graduate on time, so that they can target interventions.

By intervening early with students who are most likely to drop out, school districts can keep youth on track to graduating and work toward increasing overall graduation rates. Also, by intervening before the actual dropout event, staff can help students get back on track in ways that are both easier to do from the perspective of reaching students and cheaper to do when compared to the costs of dropout recovery. Early warning systems also help districts allocate their resources more efficiently by helping them focus interventions on students who are most likely to drop out and spend less on students who would graduate without any additional supports.

EARLY WARNING INDICATORS AND THEIR USE IN BUILDING EARLY WARNING SYSTEMS

Early warning systems are based on a set of key indicators or flags that identify those students most likely to drop out. Good indicators share four characteristics:

- **Empirically created.** Indicators are most accurate and powerful when they are based on analyses of longitudinal data that track individual student progress over time. In essence, indicators use the experience of previous student cohorts to intervene when students in current cohorts begin to show behaviors associated with dropping out among their older peers. Studies in a number of states and districts and more sophisticated statistical analyses

conducted by researchers have confirmed the consistency of such indicators in predicting who will drop out of high school.

- **Simple and easily collected.** Early warning indicators use readily available data that schools typically maintain already (e.g., grades, attendance, classroom behavior and disciplinary action).

- **Include only a few key variables.** A few key indicators are easier for teachers to monitor than a large set of predictors. K-12 analyses have demonstrated that although the underlying issues that produce a poor grade or weak attendance may be complex and vary from student to student, a small number of consistent flags alert educators to a student who is potentially falling off track. By extension, a good indicator system also makes clear which variables are *not* strong predictors of dropping out.

- **Efficient and effective.** A good set of indicators accurately identifies which students are likely to drop out of high school so that additional resources can be focused on preventing their dropping out. At the same time, a good set of indicators captures a broad swath of students who may eventually become dropouts, avoiding the "1 percent problem"—that is, indicators that are highly predictive but only identify a small percentage of potential dropouts.

Dozens of school districts and many states have developed early warning systems, using student data to flag those students who are most at risk of dropping out and who can then be identified by teams of school staff for intervention. The quick analysis of a few key student data points from administrative data bases presented to school staff in clear and concise reports not only enables staff to identify the students before they disengage from school but also helps staff develop and choose the interventions that are best suited, given the number of students they are dealing with and the types of struggles those students are exhibiting.

2. DATA EXTRACTION

WHAT KINDS OF DATA DOES A SCHOOL DISTRICT NEED?

Typically, determining a set of early warning indicators is a task for a district's department of research, assessment, and evaluation. Its staff have access to and are familiar with stored records of student data[2]. Prior research and the experiences of other districts can help guide the selection of indicators, but each school district operates in its own context and establishes its own set of indicators that best match its unique student population. The selection process begins by identifying one group of students and examining their school-related characteristics and high school outcomes in close detail. Typically, the district staff selects a group of ninth-grade students, although they can choose to analyze a group of middle-grade students if the district wishes to intervene with youth before they reach high school.

The group of ninth-grade students to be studied must be one from several years earlier, making it possible to compare data on their school experiences (e.g., attendance, grades) with their high school outcomes (e.g., whether they graduated, dropped out, or remain actively enrolled). For example, staff might select all ninth-grade students from the 2005-06 school year and a look at their high school outcomes by 2008-09 and their expected date of graduation. Studies like this that track the same group of students over time are called *longitudinal* studies. Thus, an early warning system will require a longitudinal data system, including a consistent student identifier across all years and within the graduation information file.

An early warning indicator analysis must track students at least to the time of expected graduation. If a school district is going to study a group of ninth graders, they will need *at least four years of data* for those students. Wherever possible, though, it is best to follow students up to two years *past* their expected time of graduation. This is because many students take more than four years to complete high school; it takes five or six years of data to determine their final outcome. However, the student information systems or databases for many school districts do not go back far enough to include the extra two years past expected graduation.

Early warning indicator analyses are also *cohort* studies: they follow a group of students who all started at the same time. However, it is not always possible for districts to identify the full cohort of first-time ninth graders and repeaters—data from back years may be missing or may not exist,

[2] It is assumed here any student data used in the development of an early warning system will only be shared internally with designated district or school officials having legitimate educational interests. Should any district consider sharing their student data with external partners such as local and community organizations that may be assisting with development, they must first ensure that the sharing of such student based information is in compliance with the Family Educational Rights and Privacy Act (FERPA). More details regarding FERPA regulations are available at: http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html

and some students transfer in from other districts where they may have repeated. Staff should exclude repeaters from the cohort when possible, but this is not always possible. As a fallback, staff can take the group of students identified as ninth graders in the selected year.

Once a district decides on the grade level where they want to begin the analysis and identifies the years of data needed for tracking the students, it is ready to extract three basic types of data for analysis:

- **Demographic:** Gender, ethnic background, age, free/reduced-price lunch program eligibility, English language learner status, special education status;

- **Academic:** Attendance, suspensions and disciplinary actions, course grades, and test scores; and

- **Enrollment:** Enrollment and withdrawal records.

School districts already have these types of data in their administrative files and databases. While some districts may wish to include additional types of data in their early warning systems out of interest, they do not need to collect any new data to complete these analyses.

The demographic and academic data are only needed from the ninth grade (or other selected grade) school year. This information is not needed for every year in which the students will be tracked. The demographic and academic indicators from ninth grade are then compared with their final high school outcomes to determine which indicators are the strongest predictors of whether students graduate or drop out. Only enrollment data are needed from each and every year that the students are tracked. Determining each ninth grader's final high school outcome requires the enrollment/withdrawal data from each year to catch those students who drop out or transfer before the expected year of graduation.

For each school district, the specific data measures may vary depending on what is recorded in its student information systems (SIS). For example, if both "days present" and "days absent" are recorded, a district can calculate each student's attendance rate, but some districts only have "days absent" available. For suspension data, some districts may have out-of-school suspension data and in-school suspensions combined, while others may have them separated, and others still may record only the number of days lost due to suspension.

Course grades are the indicator that varies most across school districts. Ideally, staff can count the number of course failures by each student, as well as the number of failures in math or English. But some districts only have each student's total GPA and measure whether he or she was failing by looking at an overall average. Similarly, test scores may come from state accountability tests, district tests, or end-of-course exams. Whether the goal is to track

attendance, behavior, course grades, or test scores, staff select the best measures they can from those available in the student records. For student demographic measures, staff include as many metrics as possible, though in most cases one or two of those listed above may be unavailable.

Staff use enrollment and withdrawal records to determine each student's final high school outcome (graduate, dropout, still active). To do this, they determine each student's final status from the most recent drop/withdrawal code. For example, if the sample tracks a group of students who were in ninth grade in 2005-06 through to 2010-11 (two years past expected time of graduation), then the 2011 drop/withdrawal code determines the final status. For any students missing a 2011 withdrawal record, their 2010 record would be used (and so on, going back as far as 2006 for students who withdrew during the original ninth-grade year). With the final status obtained for each student in the cohort, the local district withdrawal codes are categorized into a final outcome: 1 = graduate, 2 = drop out, 3 = still actively enrolled, or 4 = transferred out of the district.

Staff should exclude students categorized as having transferred out of the district from the cohort for early warning indicator analyses, as well as students who transfer into the cohort after the ninth grade. Unique withdrawal codes that do not easily fit into any of the above four categories (e.g., deceased) are assigned in a way that fits most closely with the district/state's graduation accountability policies, in terms of counting a student as a dropout or excluding them as a transfer. Similarly, staff may want to categorize students who are still active in their fifth or sixth year of high school as dropouts, rather than treat them as still active if relevant accountability policies count such students as dropouts.

Finally, enrollment records can be used to calculate three more indicators of student mobility (and calculated only for the student's ninth-grade year). The number of enrollment records during the ninth-grade year can be used to calculate the number of transfers students made during that year, while prior enrollment records can be used to determine how many students transferred to other schools from the eighth to the ninth grades, as well as how many student were new to the district (no prior enrollment records in the school district before the ninth grade).

DETERMINING THE BEST EARLY WARNING INDICATORS

With the sample of students defined and the basic data extracted from the administrative student records, staff can begin analyzing the data and determining the best set of early warning indicators. All of the analyses described here are simple, based only on the calculation of percentages. Any school district should be able to replicate them without the aid of outside technical support.

Before beginning the analyses, it is necessary to prepare the data for analysis. Each of the indicators must be turned into a *dummy variable* (also known as a categorical variable). These are variables that have only two values: each student is assigned either a "1" or a "0" depending on whether she or he has that specific indicator. For student demographics, this is very straightforward: students receive a 1 if they have that characteristic (e.g., special education; Hispanic; female) and a 0 if they do not fall into that group. One dummy variable must be made for those indicators if they are not already in a 1/0 format. For example, a variable for race/ethnicity will require several dummy variables, one for each ethnic category. However, variables that only have two categories (e.g., gender; eligible for free/reduced-price lunch) require only one dummy variable.

The academic indicators require several dummy variables for each indicator. For example, to prepare student attendance data, staff might create one variable for whether students had attendance rates under 90 percent, a second variable for whether their attendance rates were under 85 percent, and a third for whether their attendance rates were under 80 percent. The series of dummy variables are independent of each other (i.e., a student can be included and coded as affirmative in each of the dummy variables if his/her attendance rate is below 80 percent); the multiple dummy variables allow school staff to parse the data as needed). Comparisons between them enables staff to determine at which level, or at which cut-off, attendance rates act as the best indicator of future high school outcome. For suspensions, they might use one variable for one or more suspensions, another for two or more, another for three or more, etc. For course grades, a district could create several variables for students failing one or more semester classes, two or more, three or more, etc., as well as separate variables for whether a student failed a math class and for whether they failed an English class.

Dummy variables for test scores are often based on performance categories—for example, whether students' scores fell in the basic or below basic categories. Finally, dummy variables for high school outcomes need to be made based on students' final withdrawal status: one dummy variable for students who graduated; another for students who dropped out; and one for students still actively enrolled in the system.

As the dummy variables are created and coded, it is important to review the original data and check for errors that could lead to assigning an early warning indicator to students incorrectly. This could lead to their being incorrectly targeted for an intervention. Most errors will be data-entry issues, such as an attendance rate of 90 percent rather 0.90, or out-of-bounds entries such as "course grades" of 105 or "days attended" over 180. However, missing data can also be problematic if students who are missing attendance data or course grades are automatically and mistakenly assigned an indicator due to the way the dummy variables are coded and created. Where data are missing, districts should base decisions and selection of the key indicators on those students for whom data is available.

With the set of dummy variables coded, analysis begins by creating a table based on them *(see Table 1)*. For each indicator, the table shows how many students in the cohort fell into that category, what percent of all students in the cohort shared that indicator, how many students with that indicator dropped out, and for what percent of all dropouts represented in the latter group.

Table 1: Dropout Rates by Ninth-grade Indicators

	Characteristic	Numbers of Students with Characteristic	Percent Who Dropped Out (Efficient)	Number of Actual Dropouts	Percent of Total Dropouts (Effective)
	ENTIRE COHORT	**6,725**	**15%**	**979**	**100%**
Student Demographics	*Male*	3,496	17%	606	62%
	Female	3,229	12%	373	38%
	Asian	846	8%	7	1%
	White	4,623	13%	602	61%
	Black	1,619	19%	304	31%
	Hispanic	358	17%	60	6%
	Native	42	15%	6	1%
	Over-age	1,270	35%	443	45%
	FRL Eligible	3,083	19%	593	61%
	Spec. Ed. Status	886	21%	184	19%
	ELL Status (eligible)	181	15%	34	3%
Student Behavior	*<90% Attendance*	900	44%	393	40%
	<85% Attendance	460	59%	270	28%
	<80% Attendance	288	68%	194	20%
	≥1 Suspension	1,208	30%	364	37%
	≥2 Suspensions	586	39%	227	23%
	≥3 Suspensions	341	42%	144	15%
Student Mobility	*New to School District/System*	514	46%	238	24%
	≥1 Transfer	235	36%	85	9%
	≥2 Transfers	23	42%	10	1%
Academic Measures	*Failed Math*	167	41%	69	7%
	Failed English	192	46%	88	9%
	≥1 Course Failures	534	44%	235	24%
	≥2 Course Failures	303	55%	166	17%
	≥3 Course Failures	196	60%	117	12%
	Below Proficiency in Algebra I End-of-Course Exam	20	50%	10	1%
	Below Proficiency in English I End-of-Course Exam	17	44%	8	1%

This table enables us to compare the indicators to one another and determine which best predict who will drop out of high school. Look for those indicators that are *most efficient* and *most effective*. An efficient indicator means that most of the students with that characteristic eventually dropped out ("Percent Who Dropped Out"). An effective indicator nets a substantial proportion of all dropouts in the cohort ("Percent of Total Dropouts"). To be of practical use in an early warning system, an indicator needs to be efficient so that when students are flagged resources are not focused on students who would have graduated without additional intervention. Indicators need to be effective so that interventions capture a large proportion of the total dropouts to stem the problem significantly.

Finding a balance between efficient and effective indicators is the focus of most decision making in selecting the best indicators for an early warning system. The indicators that are most efficient are often the least effective. For example, it may be the case that 90 percent of students with attendance rates under 70 percent drop out (making it a very efficient indicator), yet few students in the cohort likely have attendance rates that low so the indicator might only identify a small number of students accounting for only a few percent of all dropouts (meaning it would not be an effective indicator). Ideally, we look for indicators where 75 percent of students with that characteristic dropped out of high school. While that is the ideal, not all districts will see indicators of such strength that are also effective. Thus, it is useful to look for indicators where more than 50 percent of the students dropped out (and if possible, closer to 67 percent).

Similarly, the most effective indicators are often the least efficient, so a balance must be found. For example, flagging students who are eligible for the federal free/reduced-price lunch program may identify over 50 percent of all dropouts, but if only 20 percent of these students dropped out, then the resources spent on intervention would not be used well in four out of five cases. Also, if half the students in the district are eligible for free/reduced-price lunch, this would result in targeting too many students from a practical perspective of financial and staff resources.

The total number of students within each indicator is also important to consider. While an effective indicator would ideally identify close to 50 percent of all high school dropouts in a cohort, those that flag 20 to 33 percent of all dropouts are often the ones selected if they are highly efficient and identify a practical number of students for intervention. Working with 20 percent of all dropouts in a school district would still be addressing a substantial proportion of the overall problem.

Table 1 (above), which synthesizes data from several school districts and states, modified for anonymity, reveals some patterns that consistently emerge. One is that demographic indicators are far less efficient than academic ones in predicting which students will drop out of high school. The exception is students who are over-age for their grade level (defined here as students whose age exceeds their grade level by the number 6 at the start of the year—that is, they are 15

or older at the start of the ninth grade or 12 or older at the start of the sixth grade). Another pattern is that test scores are typically weak indicators for use in an early warning intervention system. While they are sometimes an efficient predictor of dropping out of high school, they are typically unavailable for many students due to missing test scores and testing variation across grade levels. Thus, test scores rarely identify a large proportion of all dropouts, making them an ineffective indicator. Test scores are also not available until the end of the school year, but attendance rates, course grades, and suspensions can be calculated and used to intervene at any point in the school year, and certainly as early as the end of the first marking period.

COMBINING THE INDICATORS INTO A SET

Typically, three or four indicators make an ideal set for use in an early warning system. Combined, this is enough to identify a group of students that will represent a substantial proportion of all dropouts in terms of focusing resources for intervention. The most common indicators are attendance, suspensions, and course failures, with the particular thresholds for each varying by school district. A few districts also include over-age for grade, which can sometimes be a strong indicator that a person will drop out. However, school staff cannot always take action on over-age indicators easily, while they can intervene and effect a change in the areas of attendance, behavior, and course grades. Similarly, indicators of student mobility are sometimes moderate in their strength and may identify students for monitoring, but they typically do not bear inclusion in an early warning system.

Deciding which indicators and cut levels to use is a process; there is no single best level. In general, staff select those indicators that stand out as significantly efficient, effective, and malleable compared to others. Involving counselors in the selection of these indicators will help in determining which are best; it will also assist with the school-level buy-in process.

Staff should try different combinations, selecting several from and replicating Tables 2 and 3 below, to gauge their overall power as a set for use in an early warning system. Comparing the overall power of different combinations will help determine which set would work best and suit the district's particular goals.

If resources allow, districts and their staff should revisit these analyses each year to determine if the cut levels require adjustment as the student population shifts. Cut levels will also vary by the grade level to which they will be applied: the indicators tend to require looser cut levels (e.g., one failure instead of two; 80 percent attendance instead of 90 percent) when applied to middle grades, where student disengagement is much less of an issue.

In general, staff should establish that the selected indicators are common to those students who eventually drop out but rare among those who remain on the path to graduation. Table 2 shows

the percent of students with each indicator, and with each total number of indicators, comparing the rates for the entire cohort to those for dropouts and graduates. In this example, one-third to one-half of dropouts had each of the individual indicators, but less than one-fifth of students in the entire cohort had them and less than one-tenth of graduates had the indicators. As a combined set, more than two-thirds of the entire cohort and more than 80 percent of graduates had none of the indicators. In comparison, less than one-third of dropouts had none of the indicators; 70 percent of dropouts had one or more of the key indicators.

Table 2: Distribution of Students with Academic Indicators

	Percent of All Students (N=6,725) with...	Percent of Dropouts (N=979) with...	Percent of Graduates (N=5,045) with...
Data on Each Indicator			
<85% Attendance	16%	45%	7%
≥2 Suspensions	14%	34%	8%
≥2 Course Failures	18%	46%	8%
Number of Indicators			
0 Indicators	70%	30%	83%
1 Indicators	17%	30%	13%
2 Indicators	9%	25%	4%
3 Indicators	5%	15%	1%
1 or more	30%	70%	17%
2 or more	13%	40%	4%

Table 3 shows similar rates to those in Table 2, but this type of report helps staff decide the appropriate intervention level. Over 80 percent of the students with none of the indicators succeeded in graduating, while the graduation rate plummets below 40 percent for students with one or more indicators. However, at the 1 indicator level, the ratio of dropouts to graduates is still close to even (44 percent vs. 36 percent). For intervention purposes, staff want to ensure that an investment of additional resources would make sense for almost all the students identified. For students with two or more indicators, the graduation rate falls below 20 percent and the ratio of students who dropped out to those who graduated is almost 5 to 1 (64 percent vs. 14 percent).

Table 3: Percent Dropped Out or Graduated, by Number of Indicators (total n of students = 6,725)

	% Dropped out	% Graduated	Number of Students
0 Indicators	9%	82%	4,708
1 Indicator	37%	44%	1,143
2 Indicators	62%	15%	605
3 Indicators	73%	8%	336
1 or more	44%	36%	2,084
2 or more	**64%**	**14%**	**941**

From a practical perspective, flagging students with *two or more indicators* in Table 3 would result in identifying roughly 14 percent of the total cohort (941 of 6,725 students) for substantial and sustained interventions. Given that 64% of those flagged students ended up dropping out while 14% graduated, the targeted group would have identified over half of all dropouts in the cohort and included only 3 percent of the students who would have graduated anyway. Any programs targeting such students would catch the correct students in at least three of five cases while addressing a large proportion of the cohort's dropouts, thus making efficient use of finite resources and making a substantial impact on the overall problem. A larger set of students, those with a single indicator or students who have other indicators of interest that were not included in the set (e.g., over-age, mobility deficits) might be identified for more moderate interventions or for monitoring so that intervention can commence if additional signals begin to occur and before the students drift too far off track.

Again, research staff should replicate Tables 2 and 3 with several different sets of indicators and different cut levels (e.g., 85 percent attendance vs. 90 percent) to test which combinations to use in an early warning system. Districts must also pay attention to the total number of students identified for intervention to be sure that intervention is feasible, considering available resources.

That said, schools may not always be able to work with all students identified by the set of early warning indicators but rather may focus on select subgroups of students for staff to work with. Schools may choose to work with students who have all three indicators since those students have the greatest needs or they may choose to work with those students who have only two indicators in order to catch them before they become more fully disengaged from school. Much of the decision-making on which of the identified students to target will rest with the school leaders and staff/counseling teams who are most knowledgeable about resources and objectives.

As a district's research staff replicates tables such as Table 3 above, they should not expect to replicate those exact numbers. Each district will vary in terms of the frequencies of each indicator and how strongly they predict future dropout events. Also, districts must be aware that the numbers will vary greatly depending on whether the longitudinal data for the cohort runs only until the expected time of graduation or if it is extends further out. Because many students take longer than four years to graduate and remain actively enrolled past four years, any district whose data run only until the expected year of graduation will see numbers that appear much weaker than those in Tables 2 and 3, which are based on data two years past expected time of graduation.

Students who remain enrolled past four years of high school are much more similar to dropouts than they are to graduates in terms of how frequently they exhibit the key indicators. Accordingly, many of those who remain enrolled end up dropping out, especially those who exhibit two or more indicators. The effect of having only four years of data is that the group of students identified will seem to capture both many fewer dropouts and many more students who remained actively enrolled. Where staff are selecting indicators based on only four years of data, they should keep this effect in mind and select indicators based on their relative strengths in terms of the results they see, knowing that the same set of indicators would appear more efficient and effective given five or six years of data.

While these methods of analysis rely on simple averages, the results from districts and states that have completed the process have been tested using more sophisticated methods of statistical analyses (EGC, 2010a; 2010b; 2010c; 2011). Districts can use results based on these comparisons of averages that they can conduct themselves, knowing that more complex methodologies would yield similar results. States and districts have also found that the key indicators (typically attendance, course failures, and suspensions) operate equally as well for urban and rural districts or large and small ones (EGC, 2010b). Despite minor variations, the indicators operate with similar strengths and patterns across all types of districts (EGC 2010a; 2011). Finally, while early warning indicators have worked when applied to earlier grades, their predictive power may prove somewhat weaker than in ninth grade (EGC, 2010c).

3. REPORTING

CREATING EARLY WARNING SYSTEM REPORTS

The next challenge is to generate reports for schools that identify students flagged for intervention by school staff. This is usually a matter of working with the electronic databases or student information systems to produce the desired reports, so this step often involves a district's information technology (IT) department. While these lists are generally quite simple, producing them can often be one of the most difficult roadblocks in implementing an early warning system. For some districts, their data are stored in an SIS that can easily generate customized reports for teachers and school staff. However, the SIS databases in some districts cannot be accessed or managed easily, and producing the lists can be quite problematic.

Typically, the IT department and the district office of research and assessment collaborate closely to obtain access to all required data and develop the reports. Coordination with school-level staff is also important: they are the end users of the reports, and they are often the original source for the relevant student data. Districts also can contact the vendors and developers of their SIS platforms, who are often eager to improve their products to make them more attractive to school districts and might be willing to make customized modifications.

Table 4 is a sample spreadsheet report. Color-coding students based on the degree to which they are off track is a common tool to help school-level staff easily distinguish among students. These lists might also include additional information on each student, such as personal or demographic information, notes on his or her history, or other information that helps develop a student profile. However, lists that contain too much information are often overwhelming and counterproductive. A key goal is to keep reports as simple, clear, and concise as possible. Once school-level staff decide which students to work with, they may decide to look for more detailed data on those specific students[3].

Reports should be generated as early and as often as possible, and students at risk for dropping out should be identified early. Where possible, school staff should receive reports at the beginning of the school year that are based on the prior year's final data (e.g., last year's eighth-grade data for students at the start of ninth grade). This enables them to identify those students most likely to need extra support before they have started to fall behind in school. Throughout

[3] Again, it's important to note that early warning indicator reports based upon student data should only be shared internally with designated district or school officials having legitimate educational interests. Should any district consider sharing their reports with external partners such as local and community organizations that assist with intervention efforts, they must first ensure that the sharing of such student based information is in compliance with the Family Educational Rights and Privacy Act (FERPA). More details regarding FERPA regulations are available at: http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html

the year, reports could be made available biweekly, but they should be generated at the least at the end of each marking period as data become available. For example, students can be flagged for low attendance rates as early as the first two weeks of school if the number of absences puts them on pace to hit the district's selected indicator level for the full year. Students can be flagged for their first quarter course grades if they are failing even if credit/failure is not assigned until the end of the semester. And students who receive a suspension early in the year might be flagged so they can receive early academic or behavior support.

As noted, not all students identified by the lists are likely to be selected for intervention, and decisions on which students to target are likely to be made by school-level staff based on available time and resources, as well as on each individual student's background and case.

Table 4. Sample EWI Data Sheet Provided to Classroom Teachers

Student Name	Attendance Indicator	Attendance Rate	Course Indicator	Course Failures	Math Mark	Reading Mark	Suspension Indicator	Suspensions	TOTAL Indicators
Student I	1	84	1	2	F	F	1	2	**3**
Student Z	1	83	0	0	D	C	1	2	**2**
Student X	1	81	1	2	F	F	0	0	**2**
Student J	0	87	1	2	F	F	1	2	**2**
Student Y	1	82	0	0	D	D	0	1	**1**
Student W	1	80	0	0	C	B	0	0	**1**
Student K	1	85	0	0	B	D	0	0	**1**
Student T	0	98	0	0	B	A	1	3	**1**
Student E	0	92	1	2	F	F	0	1	**1**
Student O	0	93	0	1	C	F	0	1	**0**
Student H	0	90	0	1	F	B	0	0	**0**
Student N	0	92	0	1	D	F	0	0	**0**
Student D	0	93	0	1	F	D	0	0	**0**
Student S	0	97	0	1	F	C	0	0	**0**
Student C	0	89	0	0	A	C	0	0	**0**
Student M	0	89	0	0	C	A	0	0	**0**
Student B	0	90	0	0	A	A	0	0	**0**
Student G	0	90	0	0	C	D	0	0	**0**
Student F	0	91	0	0	D	B	0	0	**0**
Student L	0	91	0	0	A	C	0	0	**0**
Student P	0	94	0	0	C	A	0	0	**0**
Student A	0	95	0	0	C	B	0	0	**0**
Student Q	0	95	0	0	B	C	0	0	**0**
Student R	0	96	0	0	C	C	0	0	**0**
Student U	0	99	0	0	A	B	0	0	**0**
Student V	0	100	0	0	B	B	0	0	**0**

4. ILLUSTRATIVE EXAMPLES

A number of school districts have completed the process outlined in this guide to develop early warning systems. Each of the four districts described in this section has worked within its distinct context, in terms of the student population it serves, its region of the country, and its resultant policy differences. As such, the districts' processes and end products are unique, first by the specific indicators and cut-off levels each district selected and also by the types of roadblocks staff encountered.

Nashville, Tennessee, was one of the first districts to develop an early warning system. It made an initial proposal to create early warning indicators in fall 2009, and it began analyzing data in spring 2010 to determine the best set of indicators. Planning meetings took place during the summer and fall of 2010, and the district rolled out the system that winter.

Implementation went smoothly in this district, in part because every monthly meeting from the beginning included representatives of district IT staff, research staff, and the district's head of counseling. Establishing an early warning system was a long-term project, and its successful implementation was achieved largely by ensuring that the process was a collaborative and communicative effort among all departments, with each contributing expertise toward the end goal.

If they had to do the project over again, district staff report that they might engage more fully the department that oversees schools and principals to make sure school leaders fully understood the tool and had common goals and expectations for its use at the school-level. This would ensure that more schools used the tool effectively to target interventions.

St. Clair County Public Schools, Illinois, a regional office, developed an early warning system for the three school districts it oversees. All three had graduation rates lower than the state average. Regional staff followed the simple, straightforward steps outlined in this guide. First, during the 2011-12 school year, they identified a previous cohort of first-time ninth-grade students using a longitudinal database of student records. They compared the graduation outcomes of those students to their ninth-grade attendance levels, numbers of suspensions, and numbers of course failures. Once the ideal cut-off levels had been identified for each indicator, they combined them into a set.

During the following 2012-13 school year, the principal and staff at one high school piloted the early warning system. The plan is to expand it to all three school districts next year, with modifications based on experiences from the pilot year.

In starting its early warning system, **Clark County, Nevada**, found that it had a large amount of data available from their student information system, but the early warning system reports often overwhelmed school staff. Too much information negatively affected staff usage. While the district had enough data to include five to seven indicators on each student (depending on specific grade level), many of these indicators were highly related to one another, and the reports generated for school staff were confusing and required a lot of interpretation.

By eliminating some of these overlapping indicators, the district streamlined the reports and made them more concise and easier for staff to work with and use. For example, the reports dropped an indicator for students repeating a grade; "over-age for grade" was already included. Similarly, course behavior marks were dropped in favor of suspensions as the single indicator of discipline and behavior. GPA was cut, while course failures were kept. In each case, the two indicators were largely the same, but those with the stronger relationship to student outcomes were selected for use.

Selecting fewer variables created the added improvement of reducing the number of students identified to a size that could be realistically managed by the district's school-level social workers. To make the reports even more useable, the district reformatted them to list the indicators in order of priority. Listed first were those with the strongest relationships to student outcomes (e.g., attendance, course failures, and suspensions).

By contrast, some districts have developed more intricate early warning systems that include more than 304 indicators. The **Adams 12 Five Star School District, Colorado**, has an early warning system that is far more intricate than most. While it includes the categories of academics, attendance, and behavior, it also includes a social "risk factors" category based on information from a survey administered by the district to incoming freshmen. Further, each of the four categories is made up of several individual indicators. Academics include course failures and GPA, credits accumulated, and test scores. Attendance includes both unexcused and excused absences and truancy. Behavior includes out-of-school and in-school suspensions and expulsions. The social risk factor category includes measures for English language proficiency, homelessness, and student mobility between schools.

Each category counts for 100 points, with a maximum total score of 400 for a student. At the same time, each category is weighted primarily on those core indicators that analyses have determined to be the strongest: academics is heavily weighted toward course failures; attendance, to unexcused absences; and behavior, to out-of-school suspensions and expulsion. This makes Adams 12 indicators both unique and based upon solid empirical evidence.

5. SEGEMENTATION ANALYSIS

WHAT IS SEGMENTATION ANALYSIS?

Segmentation studies identify students who are considerably off track for graduation, typically defined as two or more years off track to graduate based on age and credits. These youth are highly unlikely to graduate without an alternative educational option. By carefully analyzing this population of high school students, districts can use the lens of how far students are from graduation, combined with their ages, to determine the best programming options to recover and graduate these young people.

Also, segmentation analyses can be extended beyond a district's in-school high school population to include recent dropouts. This approach enables a district to identify young people who dropped out but were close to graduation—for example, those who were short by only a few credits or had not fulfilled a state exit exam requirement. By offering programming designed to move these students quickly to the finish line, districts can often get a bump up in their graduation rates.

Underlying segmentation study is the assumption that age and distance to graduation matter in determining what types of programming are both cost efficient and effective in recapturing off track and out-of-school youth. A young person's age and how close or far she or he is from a high school diploma has implications for school schedules, curricula, and staffing. For example, a student who is older and close to graduation will benefit from flexible scheduling and opportunities to earn credits quickly. A student who is younger and much further from graduation can have up to three years before aging out of the K-12 system and will benefit from full-time, extended day and summer programming, with a curriculum organized to facilitate credit accumulation and the acquisition of college-ready skills.

Unlike studies of early warning indicators, segmentation analyses are not longitudinal and do not track the same group of students over time. Instead, segmentation studies take a snapshot of a defined population of students at a certain point in time. These types of analyses are called *cross-sectional* studies. They use descriptive statistics and do not require complex statistical analyses.

DEFINING THE POPULATION

The first step is deciding the population of students the district will include in its segmentation analysis. A district has to decide on the scope of the population to include. For example, is the district interested in segmenting all current high school students, the current high school population plus recent dropouts, only recent dropouts, or the student populations of selected high schools?

Usually, a district's segmentation analysis looks at both the current high school population and recent dropouts. Such an approach enables a district to intervene with students who are in school but so off track they are unlikely to graduate without a different option *and* to recover recent dropouts who have similar programming needs. However, fiscal constraints often lead districts to limit their analysis to a more defined group of students (e.g., only recent dropouts, only the student population of specific high schools). In these cases, districts can define the population for analysis based on their priorities. For example, is the district's primary goal to recover recent dropouts and place them in programs matched to their needs? Is it to identify off-track students are who are still in school but unlikely to graduate without a different option?

A district may also want to focus its segmentation analysis on low-performing high schools, which often have high concentrations of off track students. Such an analysis can help district and school leaders get a better handle on the types of programming needed to turn the school around and improve outcomes for students.

DEFINING THE SEGMENTS

The next step is to define the segments for analysis. In New York City's groundbreaking segmentation analysis, the district and The Parthenon Group (a national advisory group) defined three broad categories: young and far from graduation; old and close to graduation; and old and far from graduation *(see Table 5)*.

Table 5: Defining the Segments

	Age	Distance to graduation
Young & Far	17 or younger at program entry	Enough credits/skills to graduate in two to three years
Old & Close	Age 18 or older	Enough skills/credits to graduate in one year
Old & Far	Age 18 or older	Few credits, two or more years from graduation

As other districts have taken up segmentation analyses, they have adapted these categories to better align with their conditions and the goals of their segmentation studies. Table 6 shows how one district refined the categories based on its credit system and added additional ones to represent its population of high school students and recent dropouts.[4]

Table 6: One District's Adaptation of Defining the Segments

	Age	Distance to graduation
Young and Far	17 or younger at program entry	Enough credits/skills to graduate in two to three years 11 credits or fewer
Old and Close	Age 18 or older	Enough skills/credits to graduate in one year 12 credits or more
Old and Far	Age 18 or older	Few credits, two or more years from graduation, at least an 8th grade reading level 11 credits or fewer
Old and Very Far	Age 18 or older	Few credits, two or more years from graduation and below an eighth-grade reading level
Over-age Late Entrant English Language Learner	Age 18 or older	English language learners who entered the school system during high school with limited schooling and low literacy in any language

Districts may decide to expand a segmentation analysis to include students who are less than two years off track. These students may not need an alternative option but are at risk of falling further behind. At minimum, such students would benefit from close monitoring and may require a school-based intervention. Table 7 offers the segments used by a district that conducted such an analysis.

[4] Tables 6 and 7 are based on work done by the Denver Public Schools in collaboration with Jobs for the Future.

Table 7: Categories of At-risk and Off track Students, by Credits and Age at the End of the School Year

		Far		Near	
		9th Grade	**10th Grade**	**11th Grade**	**12th Grade**
Young	14/15	At-risk (<1 year behind)	On track		
	15/16	Seriously off track (1-2 years behind)	At risk (<1 year behind)	On track	
	16/17	Severely off track (>2 years behind)	Seriously off track (1-2 years behind)	At risk (<1 year behind)	On track
	17/18	Severely off track (>2 years behind)	Severely off track (>2 years behind)	Seriously off track (1-2 years behind)	At risk <1 year behind
Old	18+	Severely off track (>2 years behind)	Severely off track (>2 years behind)	Seriously off track (1-2 years behind)	At risk and old (<1 year behind)

Finally, the district has to determine the extent to which it wants to parse the data. For example, does it want to look at the data for each high school? By language background? By region/neighborhood? Again, the district can use its priorities and goals for the analysis to establish the level of analysis it wishes to conduct.

EXTRACTING THE DATA

As with early warning indicator studies, the types of data required for a segmentation analysis are typically available to the school district in their administrative files and databases. To conduct the segmentation analysis, districts need access to only two types of individual student data: *age* and *credits accumulated.* Because grade designation in high school varies widely across districts depending on promotion policies, we recommend that districts assess how far students are off track to an on-time graduation based on age and credits only.

Data on the age of students are generally straightforward and accessible. However, missing data on credit accumulation can present challenges. Students who transfer in and out of the district (and/or within high schools in the districts), are late entrants into the district high school, and/or have dropped out and then reenrolled can all have considerable gaps in their credit history and records may not be easily accessible for these youth.

Course grades can sometimes serve as a proxy for credits, but they also vary considerably by school districts. One approach to addressing missing credit data is to track individual student transcripts at the school level (which are sometimes still found in paper files). This may require more resources and staff but can be a useful strategy if the segmentation analysis targets only a few high schools. For example, analyzing which segments of students are enrolled in a district's alternative schools and which groups of students are succeeding can inform efforts to improve student outcomes at alternative schools.

Basically, a district uses the best data available from its student records, with the understanding that missing data can result in an underrepresentation in the number and percentage of students, whether within the district or in certain schools, who are off track to a high school graduation. Missing data can also curtail the level of analysis that the district can conduct.

Table 8 shows the results of a completed segmentation analysis for a mid-size urban district.

Table 8: Results from a Segmentation Analysis

Segment	Number of Students	Annual Dropout Rate
1: **7th and 8th graders demonstrating key risk factors** (from district's own early warning indicators study or established research)	NA	
2a. **9th graders who are slipping:** Demonstrating key risk factors but are still less than three credits off track	793	2%
2b. **9th graders who are falling:** Have risk factors and are more than three credits behind	1309	13%
3. **Young and far:** Age 16-17, and two or more years off track	886	37%
4a. **Old and very close:** Age 17 and less than three credits off track	559	12%
4b. **Old and close enough to graduate, but maybe not with their class:** Age 17+ and three to twelve credits off track	1,529	25%
5. **Old and far:** Age 18+ and two or more years off track	620	41%
On track	11,263	0.4%
Percent of all high schools students who are off track	33%	
Percent of off track students approximately two or more years off track	18%	

HOW CAN DISTRICTS USE THE RESULTS OF SEGMENTATION ANALYSIS TO GUIDE PROGRAMMING?

A completed segmentation analysis enables district and school leaders to identify the student subgroups that are unlikely to graduate without an intervention. The results of a segmentation analysis can provide guidance to district and school leaders concerning what types of interventions and programming different segments need. For example, districts can use these data to map the current demand for options against the district's supply of alternative programming. The analyses of the different segments enable districts to use resources strategically to redesign existing options or create new ones tailored to the specific needs of each group, based on age and distance from high school graduation.

Table 9 demonstrates how one district has used segmentation analysis to identify the types of interventions needed for students based on age and distance from graduation.

Table 9: Proposed Interventions for Each Segment

Segment	Suggested Intervention needed	Annual Dropout Rate
1. **7th and 8th graders demonstrating key risk factors** (from district's own early warning indicators study or established research)	Very clear plan for transition to proper school, likely traditional school	N/A
2a. **9th graders who are slipping:** Demonstrating key risk factors but are still less than three credits off track	Current school: Assessment and intervention needed midway through semester 1	2%
2b. **9th graders who are failing:** Have risk factors and are more than three credits behind	Current school: Assessment needed at semester **Alternative settings:** A portion will need alternate setting	13%
3. **Young and far:** Age 16-17 and two or more years off track	**Alternative settings**	37%
4a. **Old and very close:** Age 17 and less than three credits off track	Finish at current school: Clear plan for each student Some may need **alternative setting**	12%
4b. **Old and close enough to graduate, but maybe not with their class:** Age 17+ and three to twelve credits off track)	Finish at current school, though likely with later class **Alternative setting**	25%
5. **Old and far:** 18+ and two or more years off track	**Alternative setting**	41%

DESIGNING PROGRAMMING BASED ON AGE AND DISTANCE TO GRADUATION

A segmentation analysis enables a district to use resources more strategically in designing programming based on how close or far young people are from graduation. Table 10 shows the key design components for the three major groups of off track students.[5] Underpinning all of the designs is a culture in which advancing to postsecondary education is the norm, along with curriculum and an instructional approach focused on postsecondary and career readiness.

Table 10: Key Design Elements

	School/Program Model	Curriculum/Programming
Young and Far	• Diploma-granting high school • Full-time, extended-day, and summer program to accelerate	• Organized to facilitate credit accumulation (e.g., modules, competency based) • Multiyear sequence of career and postsecondary exploration
Old and Close	• Diploma-granting schools or GED programs with clear pathways and supports to postsecondary success • Flexible programming that accommodates adult responsibilities with enough time to get college and career ready	• Interdisciplinary curricula that meets multiple credit requirements and/or • Self-paced academics with strategic use of online courses • Rapid connection to postsecondary
Old and Far	• GED programs with clear pathways and supports to postsecondary success • Flexible programming that accommodates adult responsibilities with enough time to get college and career ready	• Intensive literacy and math catch-up • Transparent sequence of pre-GED academic skill development followed by GED prep coursework accompanied by preparation for credit-bearing postsecondary courses

Districts have used the results of their segmentation studies to guide decisions on investments in recovery programming. For example, in **Mobile, Alabama**, a local community foundation collaborated with the public schools to launch and conduct the segmentation study. On completion of the analysis, the district and its community partners launched a school for "old and close" students, modeling it on New York City's Young Adult Borough Centers. They later

[5] Jobs for the Future articulated the design elements in partnership with a number of districts and schools from around the country.

expanded this model to include a pathway for old and close youth who had been out of school for a number of years. Youth in this school complete the coursework required for graduation and transitioning into postsecondary education. Recently, the partners opened a Diploma Plus school for its young and far population.

After completing its segmentation analysis, the Denver Public Schools developed a strategic plan not only to align its existing Intensive Pathways to better serve the students identified in the analysis but also to develop new schools for those students with the fewest options. The resulting plan refocuses the district's Multiple Pathways Centers to serve the young and far population. Engagement Centers serve the old and close population. GED-to-postsecondary programming serves youth who are older and farther from graduation. The district's Call for Quality Schools (an RFP for new school development) specifically asked for new school proposals that would serve these specific populations. At the same time, the district adopted a weighted student funding model for all Intensive Pathway programs and revised its School Performance Framework to provide stronger weights for growth measures, such as academic skill gains.

CONCLUSION

This guide details the work required to perform data studies, launch early warning systems, and use data results to fashion highly responsive dropout prevention and recovery strategies and program options. The guide is both a road map and a toolkit. The work is compelling, informed by the work of many districts that moved boldly to lower dropout rates and raise both academic achievement and high school completion rates.

Of course, only a few frontrunner districts have a robust complement of dropout prevention, intervention, and recovery services in place or at scale to make maximum impact on the drop out issue. Nevertheless, the efforts of many districts represent a solid, impressive start in better meeting the academic, developmental, social, and emotional needs of diverse student bodies. In using data and formulating responsive systems, schools become more responsive learning environments, and step-by-step address our national dropout crisis by increasing graduation rates that help ensure the continuing economic and civic health of our country.

Much more needs to be done. Additionally, with states and districts under continued pressure to do more with less, it has become increasingly critical that staff use limited resources strategically to attain the best possible outcomes for their students—and this includes improving high school graduation rates. By identifying early warning signs and addressing them quickly, districts can keep more students on track to an on-time graduation. By carefully analyzing the population of students who are significantly off track to graduation and designing programming based on these results, districts can recover and graduate many more young people. Taken together, early warning and segmentation analyses enable the leaders of a district and its schools to develop a comprehensive strategy. These data studies help districts focus their resources to achieve the greatest impact in helping youth stay on track or get back on track to a high school diploma and ready themselves to take the next steps beyond high school.

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APPENDIX A

This guide focuses on the technical steps that districts go through to develop a set of early warning indicators. Several other resources available from the Everyone Graduates Center at Johns Hopkins University and the U.S. Department of Education address early warning systems from the implementation side:

- **Learning What it Takes:** An Initial Look at How Schools Are Using Early Warning Indicator Data and Collaborative Response Teams to Keep All Students on Track to Success

- **Team Playbook:** Using Data to Keep All Students on Track to Graduation

- **On Track for Success:** The Use of Early Warning Indicator and Intervention Systems to Build a Grad Nation

- **Mid-Atlantic Equity Center's** ***Beyond the Indicators: An Integrated Approach to School-Level Dropout Prevention***
  (http://www.maine.gov/education/speced/tools/b2dropout/reports/indicators.pdf)

- **National High School Center's** ***Approaches to Dropout Prevention: Heading Early Warning Signs with Appropriate Interventions***
  (http://www.betterhighschools.org/docs/NHSC_ApproachestoDropoutPrevention.pdf

- **Using Data to Build Early Warning Systems – Department of Education School Turnaround Learning Community (STLC) Webinar slides**
  (http://www.schoolturnaroundsupport.org/document/using-data-build-early-warning-systems)
  (Recording of event at http://vimeo.com/37739265)

- **Utilizing Early Warning System Data to Support Strategic Student Interventions – Department of Education**
  (http://www.schoolturnaroundsupport.org/document/utilizing-early-warning-system-data-design-strategic-student-interventions)
  (Recording of event at http://vimeo.com/37739265)

These companion publications provide detail on professional development and the nature of the teacher teams that support early warning systems at the school level, as well as some implementation examples and experiences from districts that have established these systems.

The guides also provide ideas on the range of possible interventions. While identifying those students most likely to drop out is a necessary first step, the larger question for school staff is what to do with this information and how to design interventions that are effective in addressing the various student needs. If most of a district's struggling students are concentrated within only a few schools, then those schools may best address the problem with whole-school reform models or classroom-level interventions. By contrast, schools in which only a few students are flagged may require the dedicated attention of one or two staff members and better connection with available services and resources.

These additional resources provide examples of interventions at the student, classroom, and school levels, and also by the specific type of indicator problem being faced (e.g., attendance, behavior, course failures).