

Achieving a Wealth of Riches: Delivering on the Promise of Data to Transform Teaching and Learning

By M Miller

It is clear that throughout the nation, teaching and learning must be transformed to ensure that all students are graduating from high school ready for college and careers. While many policy discussions focus on data-driven decisionmaking as the answer, too often these conversations do not include how classroom teachers can and should use data to improve instruction, the kinds of data that would be most useful to teachers, and the challenges inherent in teachers' data use. In fact, educators are often said to be "data rich and information poor."

Ensuring that teachers are rich in data, rich in information, and rich in the skills that enable them to improve student achievement requires focused attention from leaders at all levels, including federal policymakers.¹ As U.S. Secretary of Education Arne Duncan stated at the Fourth Annual Institute of Educational Sciences conference in June 2009, "In the months and years ahead ... we will ask millions of teachers to use student achievement and annual growth to drive instruction and evaluation."² For federal policy to best support teachers' use of data to prepare all students for college and careers, there must be a recognition of the challenges for teachers associated with data use, an understanding about which data are more and less helpful to teachers and why, and consensus on what supports and structures need to be in place at the school, district, state, and federal levels to ensure effective data use by educators.

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U.S. Secretary of Education
Arne Duncan, 2009

This brief addresses why using data represents a significant shift for most teachers in how they perform their jobs, explains the importance of using multiple types of data to affect learning, details the infrastructure necessary to encourage teachers' use of data, and provides federal policy recommendations.

New Expectations for Teaching and Learning

In the past several years, expectations for teachers have changed dramatically, moving from a focus on teaching to a focus on teaching and learning.³ With the rise of the standards-based reform movement, there has been an acknowledgment that teaching can no longer remain an isolated, independent profession in which accountability is uncommon.⁴ In 2001, with the reauthorization of the Elementary and Secondary Education Act (ESEA), the federal government solidified its shift in thinking by including accountability provisions to measure school, district, and state achievement.

For the first time, federal law clearly stated that every child could and should achieve, regardless of race, background, or ability, and that student achievement data would be publicly reported so the federal government could ensure that such learning was taking place.⁵

The understanding that teachers must be responsible for the achievement of all students has had a significant impact on instructional practice. In the past, some educators may have used data from classroom quizzes and tests or from other sources like information reported in students' files to answer the question, "Have my students learned?" They are now expected to use multiple sources of information, including students' daily work, informal quizzes, surveys detailing students' background information, end-of-course exams, and state-mandated tests, to inform their instruction. In order to do this, teachers of the twenty-first century must not just ask "Have my students learned?" but take the next step to determine, "How do I fill in the gaps for what each student does not understand?" Knowing how to create quality assessments and effectively use them, to read and interpret data effectively, and then to adjust instruction accordingly can be a significant shift for teachers.

In a school where data is being used to inform teaching and learning, teachers may also need to interact with their colleagues differently. As teachers are more likely to use data effectively when they are working collaboratively, many are being asked for the first time to work together and subject their practice to the scrutiny of their peers. These practices can be very challenging for many teachers, especially those who have taught in an isolated environment with little accountability for many years.

In addition, educators are often not trained to effectively interpret and use data. Teachers—especially those lacking a deep understanding of their content area and feeling the pressure of accountability policies—may translate data and then modify instructional strategies with unintended consequences. This includes misdiagnosing students' learning problems, inappropriately attributing data results to a student's particular ethnicity, gender, or socioeconomic status, tutoring only those students who are close to passing state tests (also known as the "bubble" students), tracking students by ability level, engaging in constant drilling on test items as opposed to developing problem-solving skills, and teaching only those subjects that are tested.⁶

It took years of teaching before I really understood how importance creating and using good assessments are to teaching. Now, when I ask myself the question "What do I want my students to learn?," I cannot separate that from asking "How will I know they learned it?" The challenge as a teacher is to design creative and effective ways to get this feedback and to use it to inform what I do every day with my kids. And when I do this work with colleagues, this is the richest professional experience I know with the biggest pay-off for kids.

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There are additional factors in high schools that make data use especially difficult for teachers.⁷ High schools are more complex organizations than elementary schools, typically broken into subject-matter departments. These departments manifest their own distinct cultures that do not always support data use or collaboration across content areas, and, unlike elementary schools, tend to be less focused on the needs of the "whole child."⁸ Beyond departmental culture, just the sheer number of students that high school teachers see every day makes data use more challenging. In a typical comprehensive high school, a teacher may instruct as many as 175 students a day.⁹ In addition to this, high school teachers often only get one lesson-planning period a day, making it difficult for them to meet with their colleagues to discuss student data and strategies for improving instruction—two critical aspects of teachers' effective use of data.



The Types of Data Teachers Need to Improve Teaching and Learning

As teachers strive to use data to make ongoing, beneficial corrections to instruction for learning, they must grapple with a wealth of data types. These include student demographic data, attendance, discipline, and course-taking information, as well as results from a range of assessments. While all of this information can to some degree be valuable to the classroom teacher, not all data are equally useful in informing daily instructional practices. It is also important to note that the data most helpful to teachers versus other educational decisionmakers are not always the same. In the recent *MetLife Survey of the American Teacher*, 90 percent of principals said that standardized tests help to better track performance, while only 48 percent of teachers reported the same.¹⁰ Just as teachers have different day-to-day activities from building, district, state, and federal leaders, their informational needs differ as well. Teachers, education leaders, and policymakers must keep the strengths and weaknesses of various data types and their intended uses in mind when designing policy and practice to improve teaching and learning.

Summative assessments

Summative assessments are generally given once at the end of some unit of time, such as the semester or school year, to evaluate students' performance against a defined set of standards. State tests mandated under the No Child Left Behind Act, as well as end-of-course tests and high school graduation exams in place in some states, are considered summative assessments.¹¹

Summative assessments describe what a student has learned after teaching has been completed, often at the end of a course or the end of the year. Given their design, summative assessments are useful for a variety of purposes. They are used by policymakers and the public to understand how well schools are educating their students. Administrators and school leadership teams might use summative assessments to understand performance trends across departments or identify schoolwide weaknesses. Additionally, if teachers have access to the previous year's summative assessment data about incoming students, they can use the information to plan interventions and make general unit-planning decisions.

However, summative assessments are not useful tools for making daily adjustments to classroom instruction to enhance students' learning. These assessment results generally provide teachers with aggregate information about student performance and do not provide access to the actual test questions.¹² For example, while summative test results can indicate to a teacher that half of his students were not proficient in multiplying negative and positive numbers, they cannot identify what particular step or steps in that process a student did not understand. Also, since summative assessments are often administered as late as possible in the school year and the results are usually made available in the summer, teachers are not able to intervene with the tested group of students.

An additional problem with the current design of summative assessments is that they are not aligned to college- and career-ready standards. It has long been acknowledged that state summative

While I certainly look at my school's summative assessment data and use it to inform my yearly planning, it is not as helpful as the assessments I use every day in the classroom. In Wisconsin, we only give a summative test in tenth grade. So, when I'm teaching a class full of seniors, data that is two years old really doesn't help inform what I need to teach the next day or the next week.

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assessments and the standards that serve as their foundation are too broad and unwieldy, vary significantly from state to state, are not reflective of college and career readiness, and are not internationally benchmarked.¹³ In order for summative assessments to measure if students are prepared for college and careers as well as provide useful data to teachers, standards and their assessments must be improved.

Interim assessments

Like summative assessments, interim assessments evaluate students' knowledge and skills relative to standards. However, interim assessments—also known as “benchmark,” “diagnostic,” or “predictive” assessments—are administered over a more limited time frame, often every five to nine weeks. They are designed to inform decisions both in the classroom and beyond, often at the school or district level.¹⁴

Interim assessments can be structured to meet a variety of needs: illuminating the strengths of an individual student or groups of students, evaluating programs, or predicting student achievement on a future assessment. Because interim assessments have a quicker turnaround time—results are often returned as quickly as in a few days to a few weeks—they are more useful than summative assessments for adjusting classroom practice. Therefore, many states and districts are investing significant funds in interim assessment systems.

However, while some interim assessments are very well designed for the classroom teacher's use, most are still missing the critical components to be useful for instructional purposes.¹⁵ Interim assessments are usually developed and administered by the school or district. As a result, the timing of the assessments is likely to be controlled by administrators rather than driven by the teacher and the instructional needs within the classroom. Currently, many interim assessments do not follow school pacing guides—documents that detail the order and timing of concepts to be taught. In these cases, when the assessment is not aligned to instruction, interim assessments test students on content they have not yet been taught. This can be frustrating for the students and provides little direction for teachers to modify instruction.

While interim assessments may prove valuable in making policy and program decisions,¹⁶ research has yet to show that these assessments help increase student achievement. However, their design and implementation flaws can be improved upon, and there is significant interest in creating interim assessments that can be beneficial for the classroom teacher.

Summative and interim assessments have received much attention in the past several years within the policy conversations about using data to improve student achievement. It is important to note that for teachers, summative and interim tests are valuable in distinct ways. From both interim and summative results, knowing that three-fourths of a class did not score well on measurement or that an incoming student did not meet proficiency for literary analysis is much like the taking of a patient's

From daily check-ins with each student, to end-of-unit exams, and quarterly interim assessment results, there are numerous tools teachers can use to check for understanding and modify instruction. During my three years in the classroom, I continued to build skills in how to collect, analyze, and use data to improve the academic achievement of my students. I cannot emphasize enough how powerful and beneficial data can be when it is used effectively.

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temperature to determine his health status. Just as high temperature can indicate a concern with a patient's health, summative and interim test scores can flag challenges with instruction or student understanding. They can also illuminate longer trends about the student as well as the class, department, grade, and school. However, policymakers need to understand that summative and interim assessments do not drive the day-to-day teaching and learning process in classrooms.

Formative assessments

Formative assessment is the process whereby teachers diagnose where individual students are in their learning and adjust instruction to ensure that all students are mastering the desired outcomes. It also is the only type of data use that has been shown to increase student achievement. Formative assessment is embedded within the daily classroom lessons, linked to an overarching instructional standard or goal. The assessments, often called “minute-by-minute” assessments, are given very frequently and are often comprised of a small number of questions that take a few seconds or a few minutes to answer and assess. What distinguishes formative assessment from summative and interim assessments is that beyond just administering a test, it is an overall teaching process that provides immediate feedback to modify and differentiate instruction among students.

In order to use formative assessment effectively, teachers need to know how to develop and embed this type of assessment into their instruction. Teachers must have strong content knowledge, they must understand each learning objective that a student must master, and they need to know how to uncover where a student might get lost and what to do to correct any misconceptions. For example, if a teacher is instructing students how to multiply positive and negative numbers, he would need to be able to break the process down and assess whether his students are following each of those steps—understanding what makes a number positive and negative, what it means to multiply numbers, and how to add negative and positive numbers. As he teaches the larger concept, part of formative assessment is in knowing all of the small steps a student must master and, most importantly, how to fine-tune instruction from moment to moment in order to enhance student understanding. Knowing how to explain a concept in a different way when a student does not understand it or how to correct misassumptions when a student gets off track is an area in which teachers often need significant professional development.

One powerful application for teachers is to use what is referred to as “common formative assessment,” meaning that educators collaborate and use the same assessment across classrooms. Because all students received the same assessment, teachers can use the opportunity to learn from colleagues whose students are doing well by asking questions and visiting classes, or by viewing other teachers' scores using electronic media. While this can work exceptionally well in both theory and practice, it is important for policymakers to note that it is not an automatic process for all educators and often requires support through effective professional development.

The needs of my students are often complex and varied. There is, unfortunately, no one size fits all method of teaching that can help them achieve at the same rate and at the same speed. Therefore, formative assessment helps me get to the heart of what is going on my students so I can provide them with individualized instruction.

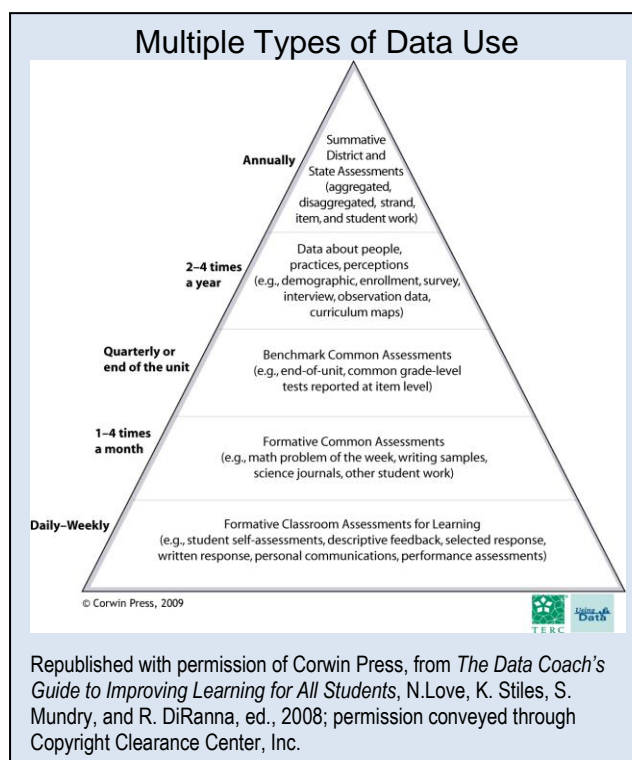
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Using Multiple Types of Data to Improve Teaching and Learning

Teachers should use data from multiple sources to inform classroom practices that will improve teaching and learning. The graphic below depicts what such a system might look like. While the majority of information is derived from assessments, especially from formative, common formative, and interim (benchmark) assessments, teachers can also use data from other sources. These data can include survey information and early-warning indicators—academic factors that can help predict whether a student is likely to drop out. While these data should be collected and analyzed less frequently than formative assessments, they are important to help establish patterns, build background information, and illuminate inconsistencies related to teaching and learning within the school.¹⁷

Just providing more data, however, does not ensure improved student learning. In order for teachers to move away from being data rich but information poor to using data to transform teaching and learning, they need to know which assessments to use and when and how to read and understand data. At the foundation, teachers need assessment literacy skills. They must be able to create valid and reliable assessments when applicable, embed assessment practices in instruction, and use multiple kinds of assessment data to make informed decisions about instruction. Teachers also need data literacy skills in order to access, convert, and manipulate data to make informed decisions in the classroom. Specific skills include the ability to compare multiple data sources, identify performance trends, link the data to student learning needs, and adjust lesson plans accordingly.



Few teachers, especially those that have been in the classroom for several years, have been taught assessment or data literacy skills in their teacher preparation courses. Therefore, it is critical that schools, districts, states, and the federal government promote effective professional development to help build teachers' abilities in these areas.

Increasing Teacher Capacity and Establishing the Infrastructure

In order for teachers to transform teaching and learning, work must be done at all levels of education reform to help ensure that teachers have the skills and support to use data effectively. Schools, districts, and states have particular roles to play in making every classroom a data-driven one.

Role of the school

Having the right support and structures in place at the school level is critical to ensuring that teachers are able to use data effectively to improve teaching and learning. Teachers not only need assessment literacy and data literacy training, they may also need help to understand district and state data



systems and the technologies that go along with them. But professional development opportunities alone are not enough to immediately change classroom instruction. The process of creating a collaborative culture that fosters inquiry and changes teaching takes time and dedication.

The structure of the school also needs to change, to allow for teachers to have common time to learn and plan together and to analyze data and discuss best practices, test outcomes, and instructional adjustments. Additionally, there are key individuals in the school building that can support this process.

- **School leaders** play an integral role in supporting teachers' use of data to impact instruction. Effective school leaders establish a compelling vision for the school and the importance of the use of data to realize that vision. It is often the principal who sets the vision for the school and establishes the importance of data-driven decisionmaking. The school leader must be dedicated to emphasizing the importance of using data to inform instructional improvements. Principals also often coordinate and serve as the head of the school's data team, a group of administrators and teachers who work together to evaluate and interpret data.
- The **data coach**, either an outside expert or a teacher within the school, helps teachers collect, understand, and use data to improve classroom instruction. Through professional development opportunities, the data coach helps teachers improve their data literacy skills, facilitates data team meetings, and encourages active collaboration and dialogue. For a data coach to be successful and effective, the school must officially recognize the role of the coach and provide him or her with enough time and authority to gather information and lead the data team in the school.

Programs That Support Schools in Establishing a Data Culture

The **Using Data Project** at TERC, a nonprofit educational and research development organization based in Massachusetts, implements a professional development program in high-poverty schools across the country. Teachers and administrators gain skills in data literacy, facilitation, leadership for sustainability, and cultural proficiency. The project, which has seen significant success in narrowing achievement gaps and improving student achievement, is focused on improving student instruction by helping educators change their school culture to one of effective data analysis through communication and collaboration.¹⁸

Developed by faculty and graduate students from the Harvard Graduate School of Education as well as school leaders from Boston Public Schools, **Data Wise** also helps schools across the country interpret data and improve classroom instruction and school performance. Like the Using Data Project, the goal of Data Wise is to empower educators to establish a process of collaborative inquiry within their schools. As an integral piece of the project, the Data Wise improvement process teaches educators how to use multiple kinds of data to improve instruction in their respective schools. Data Wise's leadership model also shifts the burden of work from solely being in the principals' domain to a more equitable distribution among principals and teachers.¹⁹

Role of the district

It is critical that the district demonstrate support for teachers' use of data through purchasing systems, modeling data use, and providing school-based support positions like data coaches.²⁰ Additionally, they need to provide continuous, high-quality professional development opportunities to enhance teachers' data analysis and assessment skills as well as their ability to use the technology to interface with the district data system. Districts can also share examples of best practices of teachers' use of data to impact instruction. It is necessary for the district to store relevant data—interim and



summative test results and early-warning indicators—in a central location, potentially in a “data warehouse,” an electronic repository that brings together multiple sources of data into one location.²¹ A data manager may be employed to disseminate the data at a district level and provide teachers with technical assistance. The district should work collaboratively with each school in order to facilitate data usage and understanding. Additionally, a district should align its curriculum with standards and assessments²² so there is congruence between the skills and content educators need to teach, the materials used for instruction, what is actually taught, and what is assessed.

Role of the state

The most important role a state can provide is to enact and support policies that encourage and build the capacity for teachers to use data to inform their instruction. Like districts, states have a responsibility to ensure that educators understand how to access and use statewide data systems, especially as states move to provide information more helpful for teachers to best correct and modify instruction to increase student achievement.²³ States can provide high-quality effective professional development for teachers to increase their assessment and data literacy skills and, when necessary, their content and pedagogical knowledge, so they are able to adapt and modify instruction appropriately. States can encourage partnerships between teacher preparation programs and districts to ensure that candidates are entering classrooms with the ability to effectively use data to inform teaching and learning. Finally, states can also model effective use of data through the use of a balanced assessment system—the collection and use of multiple types of data to inform state-level decisionmaking.

Recommendations for Federal Policy

Supporting teachers’ use of data to improve teaching, learning, and student outcomes requires aligned action at the district, state, and federal levels. As part of this, there are specific federal actions that can positively support teachers’ use of data to improve student achievement. Specific recommendations for federal policy are as follows:

- **Provide incentives for states to adopt and implement common standards.** Before using data to affect teaching and learning, teachers first must have a clear vision of what students need to know and be able to do. While many states have been working to improve their K–12 academic standards, many of those standards are still too broad, unwieldy, and neither reflective of college and career readiness nor internationally benchmarked. There has been a call for common state standards that are fewer, clearer, and higher, represent true college and career readiness, and are internationally benchmarked.
 - The federal government should provide incentives for states to adopt and implement common standards that are aligned to college and career readiness and are internationally benchmarked.
- **Ensure that summative assessments are aligned to the state-led common standards effort.** In order for data to be meaningful to teachers, assessments should measure the written content standards. Otherwise, especially in high-pressure accountability situations, teachers may teach to the test rather than to the standards. There must be a cohesive and comprehensive alignment between standards and assessments.
 - The federal government should support a parallel action to develop and validate high-quality summative assessments that provide a level of information that can inform better



decisionmaking about policy and programs and can be used by teachers in conjunction with other types of data. These assessments should be aligned to the common standards effort. The U.S. secretary of education has allocated \$350 million of the Race to the Top funds (American Recovery and Reinvestment Act of 2009) for the development of a common state assessment aligned to the common state standards. This is a good first step.

- **Support pre-service and in-service training for teachers to use data to improve student achievement.** There must be an investment in building teachers' capacity to assess students accurately using multiple types of assessments, to understand various types of data, and to know what instructional changes to make. Building this capacity must begin during teacher preparation, be maintained through induction programs (specialized, intensive professional development for beginning teachers in their first few years in the profession), and continue as needed throughout a teacher's career.
 - Teachers need to be prepared in both assessment and data literacy skills before they enter the classroom.
 - Federal policymakers should include a provision in Title II of the Higher Education Act to encourage colleges of education to integrate data use skills into preparation programs.

Many teachers already in the field, especially those in low-performing schools, also need significant support in building their assessment and data literacy skills.

- Federal policymakers should allocate Title II (ESEA) funds to high-quality professional development for teachers that is job embedded, ongoing, strategic, and sustained. As part of this, teachers should be supported in developing their capacity to use data to impact teaching and learning.
 - Federal policymakers should provide incentives for states to integrate a requirement for licensure, re-licensure, and certification to address pre-service and in-service human capacity issues around using assessment data to inform classroom practices.
- **Support innovative school structures that allow for data use in the classroom.** Having access to data and knowing how to understand and use it to effectively modify instruction does not alone ensure improved teaching and learning. The culture within the school and the structure in which schools are organized are also critical.
 - Federal policymakers should provide resources to support innovative state and local strategies that
 - a. promote a school culture focused on data use that allows for innovative scheduling solutions so teachers have time to discuss data and instruction in small groups;
 - b. supply resources for designated support staff such as data coaches to help facilitate a culture of data use to increase student achievement within the school; and
 - c. encourage the adoption procedures for the use and discussion of data within the school that include students as users of assessment results.
 - **Invest in research.** There are a number of issues related to teachers' use of data that need further exploration.
 - As part of its research agenda, federal policy should dedicate funds to explore such issues as:
 - a. the effects of summative assessment and interim assessments on student achievement;



- b. the development of appropriate assessment options for students with disabilities and for English language learners; and
 - c. the validity, reliability, instructional consequences, and equity consequences of each of the types of assessments.
- Federal policy should also support research that identifies the formative assessment practices that contribute most to raising student achievement.
 - Federal policy should support the collection and dissemination of research and best practices related to teachers’ use of data.

Conclusion

With the new educational call to action—supporting all students to graduate high school ready for college and careers—teachers are being asked to go beyond traditional roles and embrace the use of data as a critical means to improve their teaching and students’ learning. While there are examples of excellence around the country of teachers doing just this, there is still work to be done to provide the majority of educators with the training, support, and structure they need in order to use data effectively. At the same time, there is an equal need to ensure that there is a clear understanding at the school, district, state, and federal levels about what data are most helpful to educators and what supports and structures are needed. Our nation cannot afford to be “information poor” any longer. With supportive district, state, and federal policy, we need a delivery on the promise of data to improve teaching and learning.

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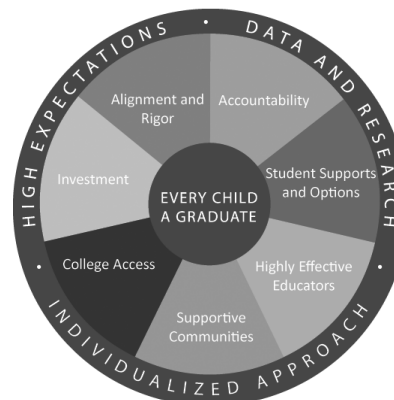
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The mission of the Alliance for Excellent Education is to promote high school transformation to make it possible for every child to graduate prepared for postsecondary learning and success in life.

The Alliance for Excellent Education is a national policy and advocacy organization, based in Washington, DC, working to improve national and federal policy so that all students can achieve at high academic levels and graduate high school ready for success in college, work, and citizenship in the twenty-first century.

The Alliance has developed a “Framework for Action to Improve Secondary Schools” that informs a set of federal policy recommendations based on the growing consensus of researchers, practitioners, and advocates about the challenges and solutions for improving secondary student learning.

The framework, shown graphically here, encompasses seven policy areas that represent key leverage points in ensuring a comprehensive, systematic approach to improving secondary education. The framework also captures three guiding principles that apply to all of the policy areas. Although the appropriate federal role varies from one issue area to another, they are all critically important to reducing dropouts and increasing college and career readiness.



Endnotes

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