School Finance Redesign Project

center on reinventing public education

ERS Education Resource Strategies

DISTRICT RESOURCE ALLOCATION MODELER (DREAM)

A Web-Based Tool Supporting the Strategic Use of Educational Resources

www.erstools.org

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The School Finance Redesign Project

The School Finance Redesign Project (SFRP) encompasses research, policy analysis, and public engagement activities that examine how K-12 finance can be redesigned to better support student performance. The project addresses the basic question, "How can resources help schools achieve the higher levels of student performance that state and national education standards now demand?"

Check in with us periodically to see what we're learning and how that information may re-shape education finance to make money matter for America's schools. You can find us at www.schoolfinanceredesign.org.

Jacob Adams, Principal Investigator

The SFRP Working Paper Series

The Working Paper Series presents analyses that are complete but have not undergone peer review. The papers are subject to change and should be cited as working papers. Their purpose is to promote discussion and to solicit reactions.

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Introduction

With growing pressure for academic results and increased mandates from *No Child Left Behind (NCLB)*, many district leaders and administrators feel overwhelmed as they struggle to provide a high-quality education for their students using existing or shrinking resources. Policymakers and practitioners often argue that more money is needed for school systems to compete. Yet statistical research shows no consistent link between the level of spending and student results (Hanushek 1997). At the same time, research and common sense suggest that strategic investment can lead to dramatic improvement in student learning.

Public school leaders face particular challenges in using resources strategically because doing so demands hard choices and long-range planning that are difficult within the traditional framework of a public school district. Resource shifts may affect jobs, and long-range plans can be swept away by a change in leadership, drop in funding, or shift in legislation. Many school leaders do not have access to information around the key drivers of district costs and the fundamental resource trade-offs among them. Too often, school and district budgets are created through a process that is one part history, one part policy, and one part politics. The result is a striking sameness in the basic organization of schools and in the spending patterns of districts (Tyack and Tobin 1994; Odden et al. 1995).

This lack of information and understanding results in resource decisions that may appear to promote improved learning but, in fact, are unlikely to change instruction. Some typical examples:

- Across-the-board class size reductions, without considering important variables such as teacher quality and experience, individual teaching strategies, curriculum quality, percentage of students in poverty, subject area content, or grade level. For example, reducing class sizes might improve student performance when overall funding levels and quality of instruction are high and when the students served might benefit from additional "customization" or "engagement." But when teacher and curriculum quality are low, there may be little primary effect on student learning from reducing class sizes. Moreover, when overall funding is low, funds spent to lower class size may reduce spending on more important instructional quality issues, dampening student performance.
- Small, yearly cost-of living increases in teacher salary—in lieu of a comprehensive teacher compensation strategy—that do not address distribution, create incentives for the best teachers to stay, or attract teachers to high-need areas.
- Fragmented investments in professional development activities. Common planning time, for example, would seem to be more effective when (1) teachers use it to review formative assessments of student work that align with school curriculum and state standards and (2) when there is expert content support to ensure that the planning time is used to address emerging student learning issues. However, many schools or districts invest either in common planning time, instructional coaches, or formative assessments, when, in fact, a more clearly specified theory might predict that all three must be present for spending on any one element to be cost effective.

- Increased instructional time without professional development on using that time effectively. For example, teaching strategies for a 55-minute English class are much different than those for a two-hour class. Creating longer blocks of time for specific subjects makes sense when teachers have strong content expertise and have received professional development on how to adapt lessons to maximize learning during this longer period.
- Standard percentage decreases or increases across all department budgets in response to changing budget expectations. A more strategic approach would be to shift resources to target a district's highest priorities or most pressing needs.

Such decisions often result because there is no easy way for district leaders to understand the interrelationships and trade-offs among resource decisions or to experiment with different combinations of policies. This gap in information and understanding leads to policies that are well-intentioned but that fall short of their desired impact.

To help school leaders build this understanding and make more effective resource decisions, Education Resource Strategies (ERS), a non-profit organization that supports schools and districts in rethinking resources strategically, developed the District ResourcE Allocation Modeler (DREAM). DREAM is based on the premise that school systems can improve student performance through a more transparent, strategic, and research-based use of district resources.

In the above examples, there is no single "right answer." DREAM supports decisionmakers in understanding how resource decisions are interrelated, and it illustrates the financial impact of different resource combinations and strategies. For large urban districts that are interested in modeling policy and strategy combinations in their specific district, ERS also has developed MyDREAM[1], a version of the model that can be customized to reflect a district's financial and other key indicators.

This paper first presents the research underlying the tool; next, it describes the tool design principles; then, it illustrates how a user might apply the tool; and finally, it presents some lessons learned and ideas for future development.

DREAM Research Base

At least 85% of a typical public school operating budget pays for salaries. At first blush, a school leader might feel that this high percentage leaves little leeway for creative budgeting. However, because time can be used in different ways, budgeting can be an art.

The art of allocating school resources for improving student learning mainly involves:

- organizing teachers and staff;
- supporting them in working more effectively with one another and students; and
- making the best use of teacher and student time.

[1] MyDREAM is prepopulated using a district's specific financial, enrollment, staffing, and other data. MyDREAM uses this district-specific data to more closely estimate the effect of different cost trade-offs and policy options. Additionally, MyDREAM allows users to build and test the cost of a system-wide resource strategy for their district.

Ideally, school leaders would be able to turn to research for guidance on how best to organize the time, people, and dollars in their school. Unfortunately, though research can provide some help, the difficulty of conducting research on the effect of school organization makes conclusive evidence hard to find. There are two main challenges in conducting research on the effects of school organization: (1) resource use is strikingly similar across both schools and districts and this lack of variation makes it difficult to study the effectiveness of different resource allocations; and (2) there is a lack of detailed information on school and district organization.

First, despite calls for restructuring, schools rarely engage in major reorganization of school-level resources (Canady and Rettig 1995). Consequently, the basic organization of schools is strikingly similar across and within districts. Elementary schools are made up of self-contained classrooms divided into grades by age. Subject specialists in art, music, physical education, and sometimes computers provide enrichment and cover planning time for core subject teachers. Most students requiring special education spend the bulk of their time in regular classrooms, leaving only to receive customized support from "resource room" teachers who are trained and certified in special education strategies. A percentage (which varies significantly across districts and schools) of these special education students are placed in separate classrooms with "special education" teachers for most of the day (Education Week 2004). Schools usually add other resources to support students needing extra help or challenges outside the regular classroom rather than integrating these resources into it. Secondary schools organize classrooms by age and subject. Teachers in these schools usually have responsibility for the learning of well over 100 students. Class sizes are the same for most academic subjects. Most schools use one of a few typical student schedules having between six to eight instruction periods daily.

Studies attempting to test the impact of different ways of organizing are limited because there are so few differences in resource use. For example, it is hard to study the impact of teacher load on student performance because there are so few examples of teachers having fewer than 90 students.

The second difficulty in conducting research on the effects of school organization arises from a lack of detailed information on organization across schools. Summary budget and staffing data collected by states and districts do not provide much information about how schools organize students for learning and how student and teacher time is used during the school day.

Despite the difficulty of generating solid information on ways of organizing that matter most for student performance, school leaders and policymakers can look to two categories of research on resource use:

1. case studies of high-performing schools; and
2. large-scale statistical studies that look at a single aspect of school organization, such as class size or individual tutoring.

Case Studies of High-Performing Schools

Case studies show that high-performing schools weave effective resource use through all aspects of their design. However, most of the well-known frameworks that categorize school success factors either do not directly address resource use or include a vaguely worded, catch-all category such as, "resources aligned" or "resources support." For example, Marzano synthesizes effective schools research over the last three decades, including the work of Ron Edmonds,

founder of the school effectiveness movement (Marzano 2003). He collapses numerous lists into five categories:

1. guaranteed and viable curriculum;
2. challenging goals and effective feedback;
3. parent and community involvement;
4. safe and orderly environment; and
5. collegiality and professionalism.

Some of these categories have resource implications, but the list provides little sense of priorities or concrete guidance for organizing schools. The National Education Association uses a set of research-based elements that describe effective schools, and that alludes to resource use (Hawley 2002). This KEYS system includes the following six "domains":

1. knowledge of teaching and learning;
2. shared understanding and commitment to high goals;
3. open communication and collaborative problem solving;
4. continuous assessment for teaching and learning;
5. personal and professional learning; and
6. resources to support teaching and learning.

Three recent studies address resource use more explicitly. In a study of 1,200 top-performing high-poverty schools, Education Trust finds six common practices (Education Trust 1999). High-performing schools:

1. used state standards to design curriculum and instruction, assess student work, and evaluate teachers;
2. increase instructional time in reading and math;
3. devote a larger proportion of funds to support professional development focused on changing instructional practice;
4. implement comprehensive systems to monitor individual student progress and provide extra support to students as soon as the need is identified;
5. focus their efforts to involve parents on helping students meet standards; and
6. have district or state accountability systems in place that have real consequences for the adults in the schools.

In a large-scale study of California schools, Williams et al. (2005) identify four practices that stand out above all others in predicting high performance. These include:

1. prioritizing and setting goals for student achievement;
2. implementing a coherent, standards based curriculum and instructional program;
3. using assessment data to improve student achievement and instruction; and
4. ensuring qualified, experienced teachers and quality instructional materials. This suggests the need to invest in teacher quality.

Chicago-based researchers combined the two approaches above—survey and school observation—to measure the level of "instructional coherence" in schools (Newmann et al. 2001).

They define schools with instructional coherence as having three overarching conditions:

1. a common instructional framework that guides curriculum, teaching, and assessment;
2. staff working conditions that support implementation of the framework including clear standards, hiring and induction procedures, teacher evaluation, and professional development; and
3. allocation of resources such as materials, time, and staff to advance the framework.

Schools that improved their scores on these conditions of "coherence" improved student performance more than twice as quickly over a two-year period as schools that did not improve these professional conditions.

Two sets of case studies, that attempt to identify critical organizational practices and to quantify them where possible, show that high-performing schools use resources in quantifiably different ways than other schools (Miles and Darling-Hammond 1998; Shields and Miles 2007).

High-performing schools explicitly organize and use resources to:

1. invest in teacher quality through professional development, job structure, and common teacher planning time;
2. create individual attention and personal learning environments;
3. focus time on core academics in longer blocks where appropriate; and
4. organize staff and other resources in creative, flexible ways to support instructional design.

Other research both confirms and expands on these guiding resource principles (Darling-Hammond 1997; Allington and Cunningham 2002; Education Trust 1999; Marzano 2003; Odden and Archibald 2001).

Large Scale Statistical Studies of School Organization

The statistical research on school resource use examines the effect of four categories of resources on student performance.

These include:

1. total per-pupil spending;
2. the use and amount of student learning time;
3. different ways of organizing to provide individual attention such as class size, grouping strategies, tutoring, and the use of instructional aides; and
4. investments in teacher professional development and the creation of common time for teacher collaboration.

We summarize the major findings of each category below.

Total Per-Pupil Spending

Although it is a subject of vigorous academic and political debate, there is no conclusive statistical evidence that when student characteristics are controlled higher-spending schools get

better student performance results (Hanushek 1997; Hedges, Laine, and Greenwald 1994; Ladd and Hanson 1999). Though these statistical results seem to defy common sense, they are not so surprising when one considers that it matters very much how resources are used (Murnane and Levy 1996). Research that seeks to document the levels of spending and patterns of staffing in schools across the nation shows that though spending levels vary, the percentage of resources spent on broad categories such as instruction, administration, and student support is usually similar. Exceptionally effective schools, however, focus a larger portion of their resources on instruction (Odden and Archibald 2001).

Use and Amount of Student Learning Time

Research confirms the practical idea that if students spend more time engaged in learning academic subjects, they learn more. However, the research clearly shows that, by itself, increasing the minutes of time allocated to instruction makes little difference. Instead, students learn more when they spend more time engaged in learning activities that align with standards and build on their level of skills and knowledge (West Ed 1998). Schools that devote more and longer blocks of time to literacy and math, and use this time well, show dramatic improvements in student achievement (Education Trust 1999; Lake et al. 1999).

Increasing the time allocated to subjects enables extra learning time, but teachers and the instructional design control whether that time benefits students. The National Center for Education Statistics (NCES) reports that elementary schools allocate an average of 68% of total time and just over four hours daily to core academic instruction (Roth, Gunn and Linver 2003). But observations and detailed teacher diaries show that the actual use of time in elementary schools can be unpredictable and inconsistent because the individual classroom teacher controls the use of time, often with limited guidance or monitoring. A study by the Consortium on Chicago School Research (Smith 1998) documents that fragmented schedules, unnecessary interruptions, and poor classroom management result in a loss of academic time for students. In some schools, only about half of the scheduled instructional time is actually used for instruction (Smith 1998). One of the most consistent findings from educational research is that when students are held to high standards and taught well, more academic instructional time improves student achievement (Marzano 2003). In other words, more time with low-quality instruction will not improve student performance.

Typically, secondary schools organize time into short, daily periods, which can limit the types of activities teachers engage in with students. For example, project-based learning, as well as other thoughtful, inquiry-based approaches, often requires blocks of time longer than 45-50 minutes. The standard high school schedule allots roughly the same amount of time to academic and non-academic subjects. The length of periods usually does not vary based on the subject. In addition, breaking the day into many small blocks reduces instructional time because students need time to change classes and then to adjust to their new classroom. So taking into account time spent in physical education classes and nonacademic electives, high school students may spend less than half of their class time in academic subjects. For this reason, analysis of traditional high school budgets often shows that barely half of total spending supports the teaching of academic subjects (Miles and Darling-Hammond 1998).

Individual Attention

Class size reduction is by far the most popular and researched strategy for increasing individual attention and thereby improving student performance. Though parents and teachers routinely focus on reducing class size as a way to improve student performance, the research tells us that reducing class sizes for all students in all subjects does not guarantee improved student achievement (Mosteller 1995; Hanushek 1997). Evidence from Title I research, where funds were used to make small, schoolwide reductions in average class size, is not convincing either.

But, a growing number of more sophisticated studies show that strategic reductions in class size can make important, but not necessarily large, differences. A series of studies that used random control groups, reducing class size for a random set of students and not for others, has led to a consensus of sorts. The widely-cited STAR study in Tennessee shows that class size reduction in the early grades (pre-K through grade 2) can make a measurable and lasting difference in student achievement, especially for students from low-income families. However, small reductions in class size make little difference in student performance. Achievement increases predictably only when class sizes are reduced to 13–17 students—or lower. The STAR study estimates that student achievement in both math and English increased by four percentile points in the first year and one percentile point in the next two years when class sizes in the early grades were dropped 32% from 22 to 15. Other research suggests that if teachers do not change their classroom practice to take advantage of class-size reductions, there is no reason to expect improved student achievement (Finn et al. 2001; Mishel and Rothstein 2002; Mosteller 1995; Zurawsky 2003).

Reducing class sizes requires significant resources. A 32% drop in class sizes from 22 to 15 as cited above would cost one-third of the average teacher compensation, or over $1,000 per pupil for a small increase in student achievement. This strategy needs to be compared with other ways of investing to improve student performance.

Effective use of resources does not necessarily require smaller class or group sizes for every subject and lesson or for all students. In elementary schools, the most effective reduction may be targeted or strategic temporary reduction of groups within classes (Slavin 1995; Loveless 1998). For instance, some high-performing elementary schools create small reading groups for part of the day by forming larger group sizes at other times of the day (Miles and Darling-Hammond 1998; Allington and Cunningham 2002). Researchers studying effective literacy teaching find that students with the most accomplished teachers of early reading spend nearly twice as much time each day in small groups—48 minutes—as compared to 25 minutes for students with teachers who are least effective (Taylor and Taxis 1999; Murphy 2004).

Schools and reading programs that most effectively promote literacy typically create small, skill-based groups for reading (Venezky and Winfield 1979; Taylor and Taxis 1999). Studies of skill-based grouping for gifted programs and other subjects suggests that such grouping works when it allows teachers to tailor the curriculum and instruction to match students' skills and learning needs (Loveless 1998; Holloway 2003). Though there is substantial agreement on the effectiveness of skill-based grouping for short periods of instruction, grouping often raises concern as well. "Skill-based" grouping refers to the practice of formally assessing students' skills by subject and creating small, flexible groups that change based on student progress assessed at regular intervals. We deliberately use this term instead of the term "ability grouping" which for some brings to mind the practice of tracking.

"Tracking" refers to the grouping of students into courses such as "general" and "honor" levels that stay together for all lessons devoted to that subject. Typically, the curriculum moves more slowly in the lower levels making it difficult, if not impossible, for students to move up to a higher-level course because they would have to skip subject matter or make it up on their own. "Skill-based" grouping, especially in the early elementary years, has the explicit purpose of ensuring that students who are missing important skills or knowledge gain them and, if possible, move to the next skill level. Henry Levin has devised a widespread comprehensive reform model based on this premise called "accelerated learning" in which students who are behind in literacy or math receive extra support so that they rejoin their peers as quickly as possible (Hopfenberg and Levin 1993).

Objections to "ability grouping" center on the concern that students in the lower levels tend to have access to inferior teachers, resources, and opportunities (Oakes et al. 1997; Gamoran et al. 1995; Burris, Heubert, and Levin 2004). In addition, researchers have shown that the performance level of a student's peers significantly affects student performance, especially for lower-achieving students and older students (Betts, Zau, and Rice 2003). This means that school leaders must be artful in considering how and when to group students for skill-based instruction. School leaders should ensure that all students have access to the most skilled teachers, that groups remain flexible, that skills are regularly and fairly assessed, and that all students spend time in whole group instruction as well. As Joseph Murphy writes, "Organizational arrangements in and of themselves have not, do not, and never will predict organizational performance" (Murphy 2004).

One way to create smaller group sizes for priority subjects or skills such as reading is to use what Taylor and Murphy call a "collaborative model" for instruction in these subjects (Murphy 2004; Taylor and Taxis 1999). This approach assembles resources from throughout the school and sometimes even the community for the purposes of reducing group size and increasing individual attention. The "Success For All" model, which has demonstrated improved reading performance, brings all special education, bilingual, reading, and librarian instructors into the classroom for reading. Some models even include and train non-instructional personnel to get involved in the effort. As with all efforts to involve others in instruction, success requires careful supervision and explicit training.

Research on the effects of class size at the secondary level is sparser because the information is so hard to collect. Few budgets or other summaries report class sizes by subject and teacher. In most secondary schools, class sizes are roughly the same in each subject, with elective class sizes tending to be smaller than class sizes for academic subjects. As with elementary schools, it may be that targeted reduction in certain subjects may prove effective. The number of students for which each teacher has responsibility may prove to be even more important than class size in some cases. With five to six classes of 25 students or more each day, most teachers have responsibility for the learning of well over 100 students each day. Needless to say, coming to know 100 students, much less grading papers carefully, becomes impossible with these kinds of loads. Though reformers like Ted Sizer, with his often quoted *Horace's Compromise*, have made reducing teacher load a centerpiece of new designs, there is little research that explores the impact of teacher load at the secondary level (Sizer 1994).

Of course one-on-one tutoring is the most costly and intense form of individual attention. Wasik and Slavin summarize studies of five different thoughtfully designed tutoring methods and find them all to have positive benefits on student achievement. The models studied include

Reading Recovery, Success for All, the Wallach Tutoring program, Prevention of Learning Disabilities, and Programmed Tutorial Reading. Though the programs varied in reading models, curriculum, and amount of tutoring, the most successful programs shared two common characteristics. First, the most successful programs had comprehensive models of reading and more complete instructional interventions. Second, programs that used certified or highly trained instructors outperformed those that used paraprofessionals. It makes sense that tutoring programs most closely aligned with the ongoing classroom activities and approach would also be more effective, but only one of the models studied (Success for All), has an integrated design and higher performance effects (Wasik and Slavin 1993).

Few question the potential power of one-on-one tutoring. Parents who can afford it pay dearly for tutoring when they feel their children need it. The question is, how does tutoring compare to other ways of improving instruction? As indicated above, reducing class size in the first grade from 22 to 15 costs over $1,000 per student, or one third of a teacher's salary and benefits for the new classroom. This investment yielded a .2 increase in standard deviation, or 4 percentile points, on the achievement test in the first year. These same resources could buy each student 20 minutes of one-on-one tutoring, and more if not all students required it.

Many schools have added instructional aides to help create small groups or provide tutoring. This strategy was especially prominent in the early years of Title I where some schools used the entire allotment to purchase instructional aides. This strategy may seem cost effective since an instructional aide costs about half or less than as a teacher. However, there is no evidence that adding an instructional aide improves student performance. The STAR study finds no impact on student achievement of giving an aide to each classroom of 25 (Mosteller 1995). There are a few examples of successful reading programs that use paraprofessionals or uncertified instructors to provide individual instruction. The successful programs carefully screen paraprofessionals, train them specifically to implement the program, and supervise and evaluate their work. Most teachers do not have experience serving in this role with instructional aides, and the low salaries make it unlikely that the most talented instructional aides will stay in these roles (Gerber et al. 2001).

Professional Development and Collaborative Time

In most schools, investing in and organizing staff to promote teacher quality is more important than making changes to increase academic time or individual attention. Research demonstrates that when faced with a choice between lowering class size by a few students and organizing to ensure higher teacher quality, choosing the more effective teacher will lead to more learning (Rice 2002; 2003; Halbach et al. 2001). In controlled experiments, reducing class size did not improve student performance until class sizes neared 15 (Mosteller 1995; Rice 2003). On the other hand, recent research shows that effective teachers raise student performance significantly more than less effective teachers. Statistically, high-quality teaching has about five times more effect than most feasible reductions in class size (Greenwald, Hedges, and Laine 1996).[2] Similarly, research that explores the effect of small group or individual tutoring shows these investments only help if the quality of instruction is high (Wasik and Slavin 1993).

[2] Of course, these findings may not hold for class sizes that are over 35. We could locate no studies that explore the impact of such large class sizes. In these cases, class size decisions become like all school resource decisions—a balancing act—balancing between teacher quality and class size. Clearly, the two are related since it will be difficult to attract high-quality teachers to unworkable conditions.

Researchers have found that increasing time spent on academics improves performance only with high-quality instruction during this time (Allington and Cunningham 2002; Allington 2005; Berliner 1979). In other words, teaching quality must come first because more time spent with poor instruction does not improve student performance.

Research demonstrates that a few strong teachers cannot generate high levels of student learning over time. Instead, teams of teachers working together over time generate the kind of sustained student learning that defies the odds. John Kain and Eric Hanushek show that students who have an above average teacher for three years in a row outperform students who have a below average teacher for three years by an entire grade level (Jordan, Mendro, and Weerasinghe 1997). Written another way, an ineffective teacher can quickly reverse the effect of an outstanding teacher in the prior grade. Students in schools where teachers organize and operate as "professional learning communities" consistently outperform those that do not (McLaughlin and Talbert 2005). Valerie Lee and associates also find that students have higher achievement scores when teachers feel a sense of collective responsibility or where there is a sense of professional community for their performance (Lee and Smith 1995; 1996; Lee and Croninger 1997). Virtually every case study of high-performing schools highlights the central importance of teachers working in small groups and schoolwide to evaluate student work and to struggle together with ways to improve it (Miles and Darling-Hammond 1998; Elmore, Peterson, and McCarthy 1996; Fullan 2001; Hargreaves 1994).

Even though many districts add resources to create instruction-free time for teachers during the school day, most schools do not create daily schedules that allow enough common planning time for teachers to systematically improve their instructional practice. Numerous studies cite the lack of teacher time to work together as a critical barrier to reform (Raywid 1993; Swaim and Swaim 1999). Research suggests that teachers need at least three hours a week to work together to make significant improvement in instruction (Bodilly and Berends 1999). Research by Rowan and associates analyzing student performance data over time, finds that common planning time, along with teacher control over instructional decisions, were the two most important workplace predictors of student performance (Rowan and Guthrie 1989).

Obviously, the existence of common planning time alone does not predict improved student performance. As the recent study by Williams and Kirst makes clear, teacher collaboration that improves student results revolves around learning and implementing curriculum materials and instructional strategies aligned with standards and using assessment data to improve instruction (Williams et al. 2005).

Creation of Instructional Coherence

There is no research that can separate out which combination of these strategies— increasing per-pupil spending, changing the use and amount of student learning time, organizing for individual attention, and improving professional development and collaboration—will result in the most improvement. The artful school leader will adjust resources to consider the trade-offs and combinations that make the most sense for his or her own students' needs and the distribution of teacher skills and interest in the building. The research is clear that successful leaders create what Tony Bryk and others have termed "instructional coherence" (Newmann et al. 2001). This means that they organize resources—time, people, and dollars—to support and enable the implementation of their instructional vision.

DREAM Design Principles

Linking budgets to strategies is particularly difficult in education because school and district budgets are not organized in ways that illuminate critical "resource" issues. For instance, knowing that a school or district spends 85% of its dollars on compensation for instructional staff does not indicate whether the teacher compensation system attracts the best teachers or encourages them to stay and grow or promotes the effective use of instructional time. ERS's work with dozens of school systems over the past decade provides access to the detailed financial and school-level staffing and scheduling data required to model and address these important considerations.[3]

ERS's own research into how high-performing schools and districts allocate resources, combined with ongoing review of the limited research on this subject, informed five design principles for the tool's organization, calculation, educational content, and policy choices.

Design Principle #1: DREAM Is Research-Based

As discussed previously, two kinds of research provide insights into which resource decisions matter most: statistical analyses that explore the link between specific inputs like teacher experience and improved student performance, and case studies that examine the complex relationships between factors that lead to higher student outcomes. Statistical analyses point to the following strategies for potentially improving student performance: changing the use and amount of student learning time, organizing for individual attention, and improving professional development and collaboration. Case studies that explore practices in high-performing schools find that these schools weave effective resource use through all aspects of their design. Case studies focused more explicitly on resource use consistently demonstrate that high-performing schools organize resources around four key strategies that ERS has dubbed the "Big Four." ERS details these strategies further through specific practices that support the four strategies.

1. Invest in teaching quality through hiring, professional development, job structure, and common planning time by:
    - Hiring and organizing staff to fit school needs in terms of expertise, philosophy, and schedule.
    - Integrating significant resources for well-designed professional development that provides expert support to implement a school's core instructional design.
    - Designing teacher work schedules to include blocks of collaborative planning time used effectively to improve classroom practice.
    - Enacting systems that promote individual teacher growth through induction, leadership opportunities, professional development planning, evaluation, and compensation.

[3] Over the last 10 years, ERS has partnered with many large urban districts, including Baltimore, Boston, Chicago, Cincinnati, Los Angeles, New York City, Providence, RI, Rochester, NY, and Washington, DC.

2. Create individual attention and personal learning environments by:
    - Assessing student learning to adjust instruction and support.
    - Creating smaller group sizes and reduced teacher loads in high-need areas.
    - Organizing structures that foster personal relationships between students and teachers.
3. Use student time strategically, emphasizing core academics and literacy by:
    - Maximizing time, including longer blocks of uninterrupted time that students spend on academic subjects.
    - Varying time and instructional programs to ensure all students meet rigorous academic standards.
4. Flexibly organize staff and other resources to maximize resources for instructional design by:
    - Integrating teaching and support resources across categorical programs.
    - Using flexible job definition, work schedules, and part-time staff.
    - Investing to leverage expertise inside and outside the school organization.

Although the "Big Four" are focused on what strategies high-performing schools use, policies and systems that are put in place by a district significantly impact whether and how individual school leaders are able to leverage these principles. The DREAM tool encourages consideration of and experimentation with different combinations of resource strategies at the district level, and it simulates their effect on financial and other resource measures.

Design Principle #2: DREAM Is Data-Based

The DREAM tool allows users to model the effect of resource changes using pre-loaded scenarios. Users can model their changes using a scenario that looks similar to their district by selecting between different sizes, population characteristics, and spending levels. The DREAM tool then uses these inputs to create a "prototypical" district budget complete with the information necessary to model high-impact policy choices. To create this detailed prototypical budget, we drew upon staffing and spending data from the National Center for Education Statistics, supplemented with much more detailed information we collected in districts across the country. The ERS development team then tested the accuracy of the modeling (calibration testing) by comparing the numbers generated by the tool to values we found in actual districts over the last decade and more.

Design Principle #3: DREAM Supports a Wide Range of Users and Goals

DREAM is organized to serve a range of users, including top district leaders, school boards, teachers' unions, reform advocacy groups, and those who work to train and support school leaders. DREAM helps users to (1) discover fundamental resource trade-offs by identifying the key cost drivers of school systems; and (2) explore the cost of specific targeted policies.

Figure 1 shows how the basic organization of the tool aligns with these three key goals. District leaders begin by exploring fundamental trade-offs through the introductory pages. Users then can explore the cost and resource use impact of more targeted policy changes in the four design centers: Elementary Schools, Secondary Schools, Teacher Compensation and Time, and

Professional Development. Finally, users can work through all four design centers to create one or more complete strategic scenarios for a district. The output pages show the cumulative impact of changes and allow further refinement. Details on each page and section of the tool are provided in the "How DREAM Works" section below.

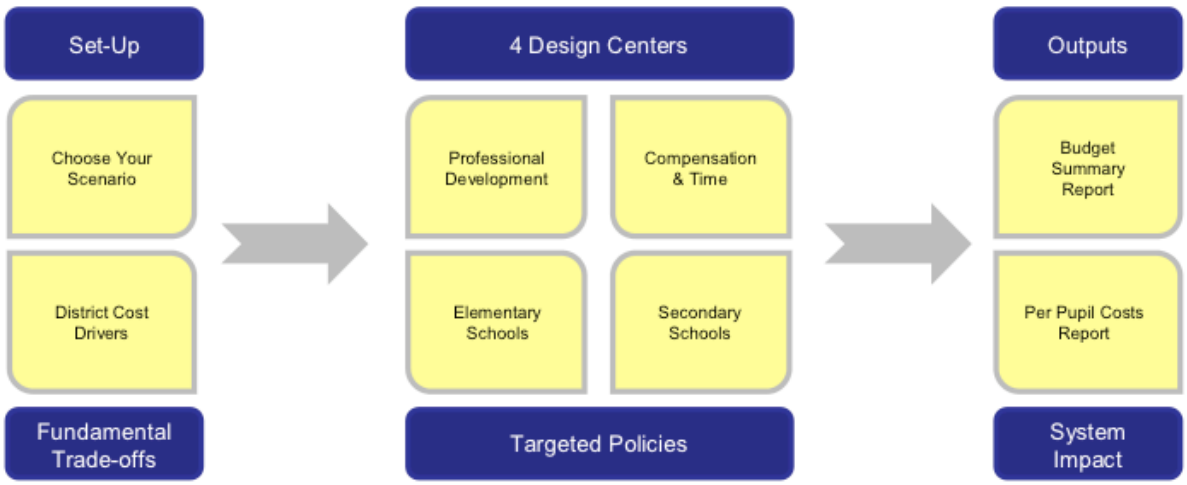

Figure 1. Basic Organization of DREAM Tool

Design Principle #4: DREAM Is Focused on Educating the User

Through the policy levers, user guidance, and organizational detail, DREAM facilitates experimentation with resource allocations that research suggests have the most impact on student performance. The summary pages and design centers allow users to explore multiple possibilities. DREAM provides users with immediate and continuous feedback. On each page, Key Indicators measuring critical drivers of the design concepts are displayed. In addition, the budget summary pages keep a running tab on the budget impact of design choices a user has made. However, the tool does not require that users make wise or practical choices. This deliberate design decision acknowledges the lack of science involved with school resource allocation and the impossibility of predicting the ways users will find to employ DREAM.

In this version of the tool, ERS has included limited content on each page around the resource concepts modeled on that page. We envision that future versions will include more comprehensive educational content. The tool also makes clear the need for benchmarking data that would enable users to compare their own use of resources to that found in higher-performing districts.

Design Principle #5: DREAM Is Accessible and Easy to Use

Resource decisions are interconnected. For instance, changes to teacher salary affect virtually all aspects of a district budget. Due to these complex interrelationships, DREAM specifies which variables users can change, when they can make changes, and at what level of detail. The model needs not only to be relatively precise but also comprehensible. Finding a workable balance of

precision and comprehensibility, as well as a system for guiding users through scenarios, took over two years of iterative usability and calibration testing.

Naturally, our budget constrained the modeling choices and user interface development as well. The development team is keenly aware of the need for a more flexible user interface and further modeling options. We will discuss some of the most pressing refinements at the end of this paper. Nevertheless, we believe that this tool, as it stands, will increase user understanding and create a passion for better use of resources.

How DREAM Works

The tool's introductory pages support users in understanding the relationships and interdependencies among key education cost drivers. Users are provided a brief summary of the research base, organization of the tool, and suggested process for using it.

Choosing a Scenario

In this section of the tool, users are prompted to choose parameters to define the district that they wish to model. Their choices are listed in figure 2.

District Enrollment: ☐ 10,000 students ☐ 25,000 students ☐ 50,000 students ☐ 100,000 students	Percent of Students in Special Education: ☐ 10% ☐ 15% ☐ 20%
District Location: ☐ Large city ☐ Other	Spending Per Pupil: ☐ $6,000 ☐ $8,000 ☐ $10,000 ☐ $12,000

Figure 2. Scenario Parameters

Exploring Fundamental Trade-Offs Through District Cost Drivers

Policymakers and practitioners typically focus on teacher salary and class size as key drivers of cost. One of the more powerful lessons learned from developing and using DREAM is that a wider set of key resource levers and possibilities should be considered when designing resource-effective, high-performing school systems. The DREAM tool reliably predicts a district's total budget using 12 key cost drivers listed below.

- Average teacher compensation.
- Total student enrollment.
- Percentage of students who have special educational needs.

- Percentage of special education students in separate, self-contained settings.
- Average elementary class sizes.
- Average secondary class sizes.
- Total instructional and teacher time.
- Investment in professional development, including teacher time.
- Number of schools.
- Percentage of the budget spent on operations and maintenance.
- Percentage of the budget spent on school-level administration.
- Percentage of the budget spent on central administration and student support services.

In addition, at budget time, because time is short, resources are limited, and no long-range vision for more strategic resource use exists, school leaders typically consider small changes to these critical levers. DREAM allows longer-range planning and scenario building that enables school leaders to explore the kinds of trade-offs that promote significant redirection of resources toward more research-based instructional strategies.

The Model District Cost Drivers Center was designed to focus users on these critical cost drivers. Once users have chosen the size, spending level, and type of district they want to work with, they can move to explore the budget effects and trade-offs associated with changing the key cost levers shown above. Used alone, the Model District Cost Drivers Center can generate powerful insights. For example, using the prototypical large city district with 100,000 students, 20% of students in special education, and $8,000 per pupil in expenditures, users might change a few of the levers to compare impact.

For example, each of the following changes increases the budget by about $4 million:

- lowering elementary class size by 1.2 students per teacher;
- increasing elementary teacher planning time by 50% from 3 hours to 4.5 hours per week; and
- more than doubling the number of professional development days in the teacher calendar from 4 to 9.

Ideally, users will explore various trade-offs and combinations of these strategies. For example, one might plan to finance the $4 million needed to fund more professional development time by increasing elementary class size by 1 student, from 23 to 24, which saves $2.5 million, and by reducing operations costs by 3%, which saves another $1.5 million.

After investigating basic drivers and trade-offs, we hope DREAM users will move to the design centers to drill down in specific areas and explore more targeted uses of resources. For example, after determining that the cost of reducing elementary class sizes by 2 exceeds the available budget, one might ask whether a larger reduction in only the earliest grades might have greater impact and be more affordable.

Four Design Centers (Targeted Policies)

To explore the costs of specific targeted policies, the tool encourages users to experiment with different policy trade-offs within each of the four design centers: Elementary Schools, Secondary Schools, Professional Development and Compensation, and Time (Instructional and Teacher). We detail these below.

Elementary Schools Design Center

The four sections of the Elementary Schools Design Center focus on finding time for teachers to work and plan together, organizing resources in ways that create more individualized attention for students, and examining all staff positions to ensure that they work together to support instruction.

Class size and planning time. The effect of class size on student performance is by far the most popular and researched strategy for increasing individual attention. Though parents and teachers routinely focus on reducing class size as a way to improve student performance, research suggests that reducing class sizes for all students in all subjects does not guarantee improved student achievement. However, class sizes in the range of 15 to 17 seem to improve student performance in the early grades, especially in high-poverty settings (Mosteller 1995; Hanushek 1997). Thus, this portion of the tool encourages users to experiment with class sizes by grade and subject.

Increasing the time teachers have to meet together helps them to improve their practice through sharing best practices, looking at student work, and planning lessons (Raywid 1993; Darling-Hammond, Ancess, and Ort 2002; Flowers, Mertens, and Mulhall 1999; Fullan 2001; Glickman 1993; Hargreaves 1994; Knapp, McCaffrey, and Swanson 2003; Miles and Darling-Hammond 1998; Elmore, Peterson, and McCarthy 1996; Cohen and Hill 2000). In the planning time portion of this design area, users consider the cost of increasing the amount of planning time for elementary teachers using the most common method of providing teacher coverage. That is, most elementary school districts provide common planning time (CPT) while students attend art, music, or physical education classes. Therefore, a cost associated with increasing CPT is the additional compensation for the specialist teachers who will be responsible for the students during these times. Users can explore how changing the size of homeroom classes and special classes provides a creative solution to increasing the number of common planning time periods while not causing large budget increases. Schools and districts can create common time for teachers in additional cost-effective ways, including adding days or additional time to the teacher calendar, both of which can be modeled in other places in the DREAM tool.

Small group support. Though not often studied, high-performing schools often find ways to work with students in smaller groups that allow more tailored instruction and interaction (Miles and Darling-Hammond 1998; Education Trust 1999; Slavin 1995). Teachers often group students in their own classrooms while they work with individual students or circulate to support groups. Using another strategy we call small group support, teachers systematically assign students to small, consistent groups with expert teachers for certain subjects and skills, like math and reading, for part of the day. Groups may change throughout the year based on students' mastery of one concept or need for further support. In the Small Group Support Page, users can decide how many days each week these small groups should meet, how many groups there should be within one class, how many teachers should teach each group, and what percentage of students should be taught in small groups.

Individual tutoring. Working with students individually allows teachers to meet students' specific learning needs that can be difficult to address through whole-class instruction. This can be especially helpful in literacy, helping students to read at grade level. Due to its high cost, districts and schools typically provide tutors to those students most in need of support. The Individual Tutoring Page allows users to explore how much it would cost to implement one-on-

one tutoring for a percentage of students systemwide. Users are encouraged to try various scenarios. For example, would it be a better use of resources to tutor a small percentage of students in each grade, or to tutor a larger majority of students in a grade when students are learning a particularly vital skill (e.g., learning to read in first grade)?

Staffing strategies. Since total compensation comprises as much as 85% of a typical district budget, staffing changes can significantly impact overall expenditures. The Elementary Schools Staffing Strategies Page allows users to experiment with changes in full time equivalent (FTE) positions not directly associated with classroom instruction (e.g., administrative, instructional support, and student services). Increasing common planning time and creating smaller, more individualized student groups may require a commitment of instructional resources. Reducing non-instructional staff can be a source of funding required by such instructional improvement strategies. For example, how would the district budget be affected in a scenario that increased the number of expert literacy teachers while also decreasing the number of librarians? Users can also experiment with changing the compensation of various positions, either in conjunction with, or as an alternative to, adding more positions.

Secondary Schools Design Center

The Secondary Schools Design Center has two sections that allow users to increase teacher common planning time, adjust class sizes and time by subject, and consider the role and cost of each staff member.

Class size and scheduling. The Secondary Schools Class Size and Scheduling Design Page lets users dive more deeply into the structure and organization of the daily schedule, the primary driver of resource use in traditional secondary schools. Both the bell schedule and class sizes determine how much individual attention and time students receive in each subject and grade. The master schedule also governs how much time teachers have for individual and joint planning. The daily schedule also can facilitate aligned instructional design. For example, a schedule that breaks the day into 8 periods of 38 minutes allows a different kind of teaching and learning experience than one that organizes four daily periods of 90 minutes each, or one that combines English and history into a single humanities course.

Users can compare the effect of eight bell schedules commonly used at the secondary level, and they can vary class sizes and teacher planning periods by subject. For example, an eight-period day with many electives might require additional staff to teach the wide variety of courses. Alternately, creating double blocks in the humanities or math and science while increasing class sizes in non-core electives can decrease class sizes and teacher loads in core subjects with limited overall increases in staff positions. Users can experiment with these different scheduling scenarios and note the changes in staffing requirements by subject and the impact on key resource indicators and the district budget overall.

Staffing strategies. Like the Elementary Schools Design Center, DREAM allows users to experiment with staffing allocations at the secondary level. As users experiment with different scheduling scenarios, they also can adjust the district's staffing allocations to reflect targeted reform policies.

Professional Development Design Center

In most school districts, investing in and organizing staff to promote teacher quality is more important than making changes to time or individual attention. Research demonstrates that when faced with a choice between lowering class size by a few students and organizing to ensure higher teacher quality, choosing the more effective teacher will lead to more learning (Rice 2002; 2003; Halbach et al. 2001; Greenwald, Hedges, and Laine 1996; Allington and Cunningham 2002; Allington 2005; Berliner 1979).

Building teacher quality requires a systemic approach that includes teacher preparation, hiring, compensation, evaluation, and ongoing professional development (Miles 2003). The Professional Development Design Center focuses on two primary ways that districts can support professional growth: through school-based professional development and by providing individual support to teachers throughout their careers, especially for new or underperforming teachers.

School-based professional development. There are several strategies a district can adopt to improve school-wide instruction, including subject-based coaches, common planning time (CPT) among teachers, and learning from one's colleagues who are department heads or lead teachers. This page allows users to explore how each of these professional development strategies, used either in isolation or in conjunction, affects the total district budget. For example, how many literacy and math coaches should there be at each school level? How is their time best used based on the needs of the district: working intensively with one teacher or working with several teachers? Additionally, how many CPT periods do elementary school teachers need? How many CPT periods do secondary school teachers need? How does the district's strategy for CPT complement the district's coaching strategy? Users can explore various possibilities and combinations to see how each strategy affects the total budget and what combination of schoolwide professional development activities are most likely to improve instruction with the least cost.

Individual careers/other professional development. A district's ability to support its new teachers and to provide growth opportunities for its experienced teachers will both improve teachers' effectiveness in the classroom as well as help to retain high-quality teachers. This page allows users to explore what supports their district can provide to new teachers as well as what opportunities for advancement their district can provide to experienced teachers.

Compensation and Time Design Center

In this design center, DREAM encourages users to consider the two critical resource levers of teacher compensation and instructional time.

Teacher compensation. Devising a powerful teacher compensation strategy merits its own model and the DREAM tool does not attempt sophisticated modeling of such changes. Instead it promotes inclusion of total teacher compensation, not just salaries, when considering various resource strategies, as benefits comprise anywhere from 15% to 30% of total teacher compensation in the districts we have studied.

Instructional time. In this design area, users can model the cost of increasing time per day or total days for both students and teachers. DREAM includes instructional time in the same design center as teacher compensation because the model calculates the cost of adding time by increasing teacher compensation proportionately to pay for it. Of course, if a district can

negotiate a different way to fund new time or pay for it at lower rate, the cost will be proportionately less.

Reports and Results (Understanding System Impact)

DREAM helps decisionmakers build a systemwide resource strategy for their district. As users become more adept at manipulating the tool, they not only can gain a deeper understanding of the connection between resource use and student performance, they also can model more complex scenarios using the targeted design centers. This exercise may lead to real changes in thinking and behavior around resource allocation.

The Budget Summary and Per-Pupil Cost Pages provide users with cumulative summaries of a district's key resource indicators, operating budget, and per-pupil expenditures based on the data they have entered in each of the Design Centers.

The Budget Summary Page displays the district's budget detail and is organized by the five functional areas of the operating budget: student instruction, leadership and administration, student services, instructional and school support, and operations and facilities. The budget detail includes both the starting values—numbers that are pre-set based on the district parameters the users chose up front—and the redesigned values based on chosen policy decisions. The tool also calculates the difference between the two. At any point in time, users can see the financial impact of their policy choices.

The Per-Pupil Cost Page summarizes total spending for the district and measures how all options chosen on previous pages affect spending for particular student types and programs at elementary, middle, and high school levels. Users also can experiment with making per-pupil changes, such as increasing the amount spent on students with special needs, and see the budget implications of those changes.

An Example of DREAM's Capability

An example of how one might use the Elementary Schools Design Center to weigh trade-offs illustrates DREAM's potential power. In the introduction, we discussed the limitations of across-the-board class size reductions without considering other important factors. For the purpose of this example, assume that a user wants to understand the costs and benefits of an across-the-board class size cut relative to more focused strategies. In particular, this user has been researching the effectiveness of implementing common planning time and significant, targeted reductions in class time and is curious about the staffing and cost implications of this approach relative to an across-the-board class size reduction. The user sets the parameters to model a large city district of 50,000 students, 15% of whom are in special education, with per-pupil spending of $8,000.

Weighing the Trade-Offs

To weigh the trade-offs, the user enters the Elementary Schools Design Center and chooses the work area that addresses his or her needs, in this case, the Class Size and Planning Time Work Area.

Class Size and Planning Time Overview

The Class Size and Planning Time Page is based on the premise that varying class size can be a key strategic lever for improving instruction, particularly when it is done within the broader context of supporting high-quality instruction. The Class Size and Planning Time Page lets users explore the relationships and interdependencies between average class size, total planning hours per week, number of teachers, and the total district budget.

Upon opening this page, the user comes to the introductory paragraphs of the Class Size and Planning Time Work Area and reads a summary of the research base surrounding class size and common planning time including the following:

- **Class size.** Varying class size can be a key strategic lever for improving instruction. Although class size reduction, especially in the early grades, can make measurable and lasting differences in student performance, achievement increases predictably only when class size nears 15 students. Research suggests that low class sizes make the most difference for students in high-poverty schools. Raising class size in certain situations can free resources for other investments to improve instruction.
- **Common Planning Time.** Research shows that increasing teachers' common planning time—ideally to at least one 90-minute planning period per week—helps improve instruction by allowing teachers to share best practices, look at students' work, and plan lessons together.

Work Area Overview

Following the overview pages, the user encounters the Class Size and Planning Time Work Area (as shown in figure 3 below) that encourages him or her to experiment with changing the number of planning hours per week and with varying average class sizes by grade level for homeroom and non-core academic areas such as art, music, and PE. At the elementary level, homeroom refers to the class in which students remain for the majority of their school day. Figure 3 shows the Work Area before any resource allocation changes are made.

	base case	redesigned
planning hours per week	3.0	
of total planning hours, how many are for common planning?	0.0	0.0

AVERAGE HOMEROOM CLASS SIZES

	self-contained sp. ed.	pre-k	k	1	2	3	4	5
base case	7	21	21	21	21	21	21	21
redesigned								

AVERAGE CLASS SIZES IN SPECIAL SUBJECTS (ART, MUSIC, PE)

	pre-k	k	1	2	3	4	5
base case	21	21	21	21	21	21	21
redesigned							

Figure 3. Class Size and Planning Time Work Area

Key Indicators Overview

The user then moves to the second section of the Class Size and Planning Time Page, the Key Indicators section (see figure 4 below). This section provides a summary of the base case, or starting values, for the number of homeroom teachers, self-contained special education teachers, special subject teachers, and the total school system budget. As the user experiments with resource trade-offs in the work area, the net effect on these variables can be monitored in the redesigned and difference columns.

The Teacher FTEs section displays the cumulative effect on the total number of elementary teachers in the district resulting from the user's resource allocation choices throughout the Elementary Schools Design Center. Figure 4 shows the Key Indicators and Teacher FTE Outputs before any resource allocation changes are made.

key indicators.

	base case	redesigned	difference
homeroom teachers	1,028.5	1,028.5	0.0
self-contained special education teachers	105.0	105.0	0.0
special subjects teachers	114.3	114.3	0.0
total teachers	1,247.8	1,247.8	0.0
school system budget	$400,000,000	$400,000,000	$0

teacher ftes.

	ftes	estimated $
additional teachers from changes to class size and cpt	0.0	$0
additional teachers from changes to flexible grouping	0.0	$0
additional teachers from changes to indiviudal tutoring	0.0	$0
total additional teachers required	0.0	$0

Figure 4. Key Indicators and Teacher FTE Outputs

What If?

The user now may begin experimenting with the key levers and see instantaneously the impact of those choices on the total school system budget and other key indicators.

To begin, the user wants to understand the staffing and cost implications of an across-the-board reduction in elementary school class size from 21 to 19 in grades K through 5. Figure 5 illustrates this change. Because the user is maintaining the traditional model where classes move from "homeroom" to specialists as complete classes, the user must reduce both homeroom and specialist class sizes in the "redesigned" cells.

The budget summary at the bottom of the page indicates that this change would require 118 additional teachers and cost $7.6 million. With this information in hand, the user chooses the "reset page values" button at the bottom of the page to clear the entries so that he or she can experiment with alternative strategies.

AVERAGE HOMEROOM CLASS SIZES

	self-contained sp. ed.	pre-k	k	1	2	3	4	5
base case	7	21	21	21	21	21	21	21
redesigned		19	19	19	19	19	19	19

AVERAGE CLASS SIZES IN SPECIAL SUBJECTS (ART, MUSIC, PE)

	pre-k	k	1	2	3	4	5
base case	21	21	21	21	21	21	21
redesigned	19	19	19	19	19	19	19

key indicators.

	base case	redesigned	difference
homeroom teachers	1,028.5	1,134.6	106.1
self-contained special education teachers	105.0	105.0	0.0
special subjects teachers	114.3	126.1	11.8
total teachers	1,247.8	1,365.6	117.8
school system budget	$400,000,000	$407,550,171	$7,550,171

Figure 5. Work Area and Key Indicators for Across-the-Board Class Size Reduction

After reviewing a brief summary of the research on class size and common planning time, this user believes that incorporating 90 minutes of common planning time into the daily schedule for all elementary schools, combined with targeted class size reductions, may have more impact on instruction than the expensive, across-the-board approach. The user decides to determine what it would cost to finance increased planning time for elementary school teachers by 50% in order to allow 90-minute blocks three times each week, intending to use art, music, PE, and reading specialist teachers to cover teachers during this time (see figure 6). What resource trade-offs can be made to mitigate the cost of this strategy? What impact would this have on teacher staffing requirements?

First, the tool assumes that any increases in total planning hours are designated for common planning time. Therefore, to increase total planning time to include 90 minutes of common planning time, the user should add this time to the base case, revising the data field to read 4.5 planning hours a week.

	base case	redesigned
planning hours per week	3.0	4.5
of total planning hours, how many are for common planning?	0.0	1.5

Figure 6. Work Area With Increased Planning Time

Increasing common planning time for teachers without changing anything else noticeably increases the district's budget. A quick check of the key indicators below reveals that the cost of this strategy, in isolation of making any other resource allocation changes, is $4.7 million and requires an increase of 73.4 teacher FTEs (see figure 7).

key indicators.

	base case	redesigned	difference
homeroom teachers	1,028.5	1,028.5	0.0
self-contained special education teachers	105.0	111.2	6.2
special subjects teachers	114.3	181.5	67.2
total teachers	1,247.8	1,321.2	73.4
school system budget	$400,000,000	$404,702,572	$4,702,572

Figure 7. Key Indicators Illustrating Cost of Increased Planning Time

The user has read the research showing that reductions in class sizes in the earliest grades improve student performance and, therefore, chooses to adjust class size to 17 students per teacher for pre-K, kindergarten, and grade 1. In order to afford this, the user tests various scenarios and discovers that raising class sizes to 25 in grades 4 and 5 frees up funds to pay for the dramatic class size reduction in the earliest grades. In addition, the user experiments with class sizes in art, music, and PE and finds that combining classrooms for these classes and increasing class sizes to 30 in grades 3–5 can finance both the increase in planning time and the reduced class sizes in the early grades

Figure 8 shows how the increase in homeroom and specialist class sizes appears on the screen in the "redesigned" rows.

	base case	redesigned
planning hours per week	3.0	4.5
of total planning hours, how many are for common planning?	0.0	1.5

AVERAGE HOMEROOM CLASS SIZES

	self-contained sp. ed.	pre-k	k	1	2	3	4	5
base case	7	21	21	21	21	21	21	21
redesigned		17	17	17	21	25	25	25

AVERAGE CLASS SIZES IN SPECIAL SUBJECTS (ART, MUSIC, PE)

	pre-k	k	1	2	3	4	5
base case	21	21	21	21	21	21	21
redesigned	17	30	30	30	30	30	30

Figure 8. Class Size and Planning Time Work Area With Strategic Class Size Modifications

After making strategic and targeted increases in class sizes, the net impact on the total school system budget is a decrease of 3.5 teachers and $226,000 (see figure 9 below). These resources could be used to reduce class sizes in special subjects or to provide expert support to teachers in using their newly-increased planning time more effectively.

key indicators.

	base case	redesigned	difference
homeroom teachers	1,028.5	1,004.2	(24.3)
self-contained special education teachers	105.0	111.2	6.2
special subjects teachers	114.3	128.9	14.6
total teachers	1,247.8	1,244.3	(3.5)
school system budget	$400,000,000	$399,773,571	($226,429)

Figure 9. Key Indicators Illustrating Increased Planning Time and Strategic Class Size Modifications

This example demonstrates how a user can experiment with alternatives to the "standard" improvement initiatives. In this case, the user was able to quantify an across-the-board class size cut, then develop an alternative, more focused instructional improvement initiative by implementing 90 minutes of common planning time in every elementary school three times a week and reducing class sizes to 17 in pre-K through grade 1. Clearly, these choices come with

trade-offs. We hope this tool will spur discussion of such trade-offs and further research into what matters most.

Our DREAMs for the Future

The process of using and creating this DREAM tool offers opportunities for further research and uncovers the need for more sophisticated understandings and tools in at least four areas.

First, it is important to use this information to create a benchmarking and best practices database. Districts want to know how other districts of similar size and demographics spend and organize resources. They also want to know what works. Using real data from districts across the country, a database would enable districts to compare not only what others are doing but also how well they are doing it. In addition, the database would enable researchers to track district resource use over time.

Second, ERS is developing a school-level tool, similar to the district tool. This tool will support principals and other school-based administrators in linking resource allocation with student performance. Because it is at the school level, many of the resource trade-offs and consequences will be more nuanced and refined.

Third, we would like to expand the DREAM tool's capability to help users understand the cost implications of their resource choices over several years, not simply one year. While the tool is effective in helping users analyze current data, the reality is that strategic investments need to be made over time and have a long-lasting impact. For example, raising salaries for new teachers in one year will have a much greater cost five years out.

Finally, future versions might provide coaching and further information related to user choices, such as research or feedback on results. Currently, users get relatively little response to the data they enter or to the policy options they choose. DREAM calculates the impact of resource decisions on budgets and on resource measures, but it does not coach users when they enter data that could not possibly be correct, do not make sense, or seem contrary to research on high-performing systems. Future versions might enable more ways to access information on research related to particular resource decisions and provide more feedback to users about the results of different scenarios.

We hope that the DREAM tool builds leadership capacity and excites users to consider a wider set of resource levers and to think about resource trade-offs more strategically. We hope that DREAM promotes discussion and research on how well they use these resources. Most importantly, we hope this tool enables users to "dream" bigger about how schools and districts might organize resources to foster improved student and teacher performance.

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