

**Connecting Spending to Educational Strategies through an Integrated Resource  
Information System (IRIS)**

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The IRIS (Integrated Resource Information System) project is designed to identify how resources are distributed across schools, and among teachers and students, and to assess the impact of those resources. IRIS is based on a resource indicator framework that bridges district information systems (e.g., student information system, human resources system, professional development tracking system) and identifies where data system enhancements are needed. Although the framework upon which it is based is rooted in school finance adequacy, this framework is used in this project not to identify an adequate amount of resources but to determine what resources schools have and how they are being used to promote improvements in teaching and learning.

Our paper describes the methods of this project, and is divided into four sections.

- The first section describes the need for the IRIS project and its long term goals.
- Section two provides the background and context for the project, including the research context in the form of a short literature review, and the district context, including pertinent information about the project site.
- Section three describes the methods for the study including the conceptual framework used in mapping the IRIS resource indicators to source systems, the sampling structure for some of the initial site-based discovery work, and data analysis.
- Section four discusses some preliminary findings which highlight the successes and remaining challenges of these methods. The final section also outlines the project's next steps.

This is the first in a series of papers on this project, the next of which will include more extensive findings from the data collection phases described in the methods section.

## I. Introduction

In today's climate of limited resources and high expectations, it is more important than ever for school districts to know the effectiveness of the various programs and strategies to which they allocate funds. Utilizing such information is the most effective way that districts can expect to make gains even as their budgets shrink. The project described in this paper is dedicated to building a system where such information is readily available, which is a complex undertaking for many different reasons.

One reason this undertaking is so complex is that it requires a change in how people think about school finance. School district administrators, district finance people, school leaders, and school finance researchers alike are accustomed to thinking about finance as largely separate from the main function of districts and schools, which is instruction. The finance department of a school district central office tends to be completely separate from the office of curriculum and instruction, and the bulk of the school budget on file with the district's finance department is most often established with little input from the school's principal or teachers.

In a typical school district, the district administrators decide how many classroom teachers, specialist teachers, pupil support staff, administrators, and clerical and custodial staff to allocate to each building, which comprises the bulk of the school budget. This means that the amount of discretionary money available to schools is minimal. However, adding a layer of complexity to this picture is the fact that although the amount of money school leaders control is small, that does not mean that the decisions principals and teachers make about the use of resources at the school site are inconsequential. On the contrary, they decide *how* to use those resources to deliver the highest quality instruction

possible, and this, as noted by Cohen, Raudenbush and Ball in their 2003 article, is an important determining factor in how much students learn. For example, a school may decide to use an experienced teacher to provide coaching within their building, relieving the teacher of one period of teaching to fulfill this duty. The impact, according to the research, from this practice can be quite large in terms of improving instructional practice, but it has no budgetary implications. That teacher still appears as a 1.0 FTE, yet it is the differential use of that 1.0 FTE teacher that may impact overall school effectiveness, because the master teacher is helping other teachers improve in their classrooms.

Districts need to know which allocations of resources make a difference. If many of the decisions that schools make are invisible in terms of the current budgeting/resource tracking process, how can we expect to answer questions about which resource allocations are most effective? One answer is to retool existing information systems so that they capture these nuances of resource use. This is one of the long term goals of IRIS.

Building IRIS requires first identifying all of the desired pieces of information, determining where that information resides and thinking about ways to integrate various information systems at the district and site level. Thus, one of the short term goals of the project is to ensure that the framework captures all of the desired information for making decisions about effective resource allocation.

Another long-term goal is to connect higher quality resource data down to the student level, which requires a student-teacher linkage. As the section on district context describes, Milwaukee Public Schools is already in the process of developing such a

system. Ultimately, the combination of better data and integrated information systems will allow the district to make better decisions about resources that yield ever higher levels of student achievement. The next section provides some background to this study, both in terms of the research context and the district context.

## **II. Background and Context**

This section begins with a brief literature review of the research that preceded this study, including many of the ideas and projects that led to the conceptualization of IRIS. The subsection following the literature review provides a brief sketch of the project site, Milwaukee Public Schools, including its policy context and recent initiatives.

### **Literature Review**

The IRIS project stems from a foundation in the recent history of school-level resource analysis. School finance analyses were traditionally conducted at the district level because that is how resources have usually been dispersed from the state, and the district level was the only level at which resources were required to be tracked. As the era of accountability and data-driven decision making arrived, so did the desire for a more detailed look at how resources were being spent at the school level. The IRIS project is part of that quest for to understand school level, and even more ambitiously, classroom and student level resource data.

There are different methodological approaches to studying school-level and student-level resources. One methodology is the resource cost model (RCM) created by Jay Chambers (Chambers, 1999). “The RCM is a bottom-up approach to expenditure analysis that uses the service delivery system as the unit of analysis and, to the extent possible, uses direct measures of the physical ingredients of service delivery to measure

resources” (Chambers & Wolman, 1998, p. 4). This is a departure from previous accounting methods that strictly focused on dollar amounts in general categories without an overt connection to personnel time or other specified instructional resources.

In Chambers and Wolman’s (1998) analysis of the cost of special education in Ohio, they organized the resource data into direct instruction and related services (i.e., regular instruction provided by different types of teachers, special classes, supplemental resources such as teacher aides, resource programs with specialists serving both students and teachers, and external placements), school and district administration (e.g., administrative personnel duties such as those of principals), and support services (e.g., transportation). In order to begin their examination, they indicated that it is imperative to start with an all-inclusive staff list of people who provide services, not limited to only school district employees. Anyone who provides services should be included on the list and coded according to their actual responsibilities and duties (Chambers & Wolman, 1998).

Following Chambers’ resource cost model, William Fowler developed the downward accounting extension (DAE) which utilized the district budget as a source for creating a school-level budget (Fowler, 2001). Building on these two, Hartman, Bolton, and Monk (2001) combined these two strategies to come up with an approach that uses DAE to collect expenditure data and RCM to collect staff data.

Our approach differs to some extent from a cost-accounting or budget system that allocates costs to students<sup>1</sup>. We believe that most districts are not ready to make the jump from the current system of broad object-, function-, and program-based categories at

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<sup>1</sup> This paragraph was written as part of the IRIS grant proposal submitted by Robert Meyer, Allan Odden, Anthony Milanowski, Jeff Watson, Eric Camburn, Sarah Archibald, and Sarah Mason (2008) submitted to the U.S. Department of Education.

district and sometimes school levels to true student-level budgeting and accounting. IRIS provides most of the benefits of student-based budgeting and accounting, in that it makes it possible to assess the effectiveness and efficiency of educational inputs and to learn how to develop some of the data elements that a student-based system will need. Moreover, because of the nested nature of the data we collect, we tie all school- and classroom-level resource data to students. The site for this project is particularly conducive to this sort of study because of its history of using value-added metrics and recent work on performance management and building information tools to support decision making and planning. These, and other aspects of the district context, are described in the next subsection.

### **District Context**

In 2007-08, Milwaukee Public Schools (MPS) served 87,360 students, the lowest enrollment the district has seen since the 1980s. Birth declines, the expansion of the voucher program, and the growing number of non-MPS charter schools has contributed to decline in enrollment. Even among the schools that remain a part of MPS, there is great variation in how they are structured. For the 2007–08 school year, the district had 213 schools, 136 of which were traditional schools; the rest were either partnership, contract, instrumentality charter or non-instrumentality charters. Partnership schools are schools that have some private students and some students from MPS—these schools may or may not be part of the choice program. Instrumentality charters are schools with charters from the district that allow them increased flexibility over scheduling and curriculum, but the teachers are still part of the collective bargaining unit. In non-instrumentality charter schools, staff members are not a part of the union and thus the

school enjoys increased flexibility over staffing and budgeting in addition to the freedoms afforded instrumentality charters.

The district has been led by the same superintendent, William Andrekopoulos, since 2002. The chief financial officer, Michelle Nate, has also been in the district for many years. However, in the past couple of years, due to a number of retirements, some central offices, including the Office of Instructional Leadership and Supervision (OILS) has a number of vacant positions and thus room for significant changes to instructional leadership at the district level.

As the enrollment figures indicated, the phenomenon of choice and charters is now a significant shaping factor in the district. At the same time, district leadership has decentralized many functions to the site, including the majority of professional development and the hiring of teachers. Using professional development as an example, this has given schools additional freedom to design and administer meaningful professional development for their staff, but at the same time it presents an additional information challenge for the district. What kinds of professional development are being offered, on what topics, and who is providing them, are just a few of the pieces of information that are now held at the site level. As the last section indicates, part of the IRIS work over the next few years will be to continue to support the district in refining and administering its new system for collecting this information.

At the same time, as greater numbers of schools fail to meet adequate yearly progress (AYP) in multiple years, the district has been under increased sanctions from the state, including being designated as a district identified for improvement (DIFI). Schools that fail to meet AYP in multiple years are designated as schools identified for

improvement, or SIFI. Such sanctions have increased pressure on the district and on schools to improve student achievement. District leaders are deploying a number of strategies to help schools improve, and could be aided in this task if district leaders had knowledge of resource use at the nuanced level described in the introduction – not merely the number of FTE, but exactly how they are used.

The district currently has an initiative called Performance-Based Budgeting System (PBBS), which is tied to its strategic plan for 2007–12, *Working Together, Achieving More*. Performance-based budgeting has been implemented in about one-fifth of its schools including some charter schools. This system ties the budgeting process directly to the school’s educational plan, which is the district’s term for a school improvement plan. One difference between this approach and the type of budgeting process that could be facilitated by an integrated resource information system is that PBBS sets certain expectations for spending based on pre-specified categories (such as parent involvement) that are the same for all schools, ultimately limiting the flexibility of principals to apply resources where they are most needed.

Another initiative to help the district track school performance is the use of value-added analysis. For the past 8 years, the district has partnered with the Value-Added Research Center (VARC) at the University of Wisconsin–Madison to collect and analyze data that assesses student growth from year to year. VARC researchers have recently been working to deliver value-added estimates for classrooms and other levels of aggregation such as regional grouping of schools or to measure the impact of large scale interventions. In addition to developing value-added metrics, MPS and VARC have been working to improve the district’s capacity to connect teachers to students. This linkage,

combined with the information about resource use, will allow the district to tie resource allocations down to the student level.

The next section describes the methodology of this study, including the conceptual framework, the sampling structure for the initial site-based work, and plans for data analysis for this project.

### **III. Methods**

Our study utilizes the school-level expenditure framework developed by Odden, Archibald, Fermanich, and Gross (2003). This framework organizes a single school's resources into instructional categories (i.e., school program indicators, core academic teachers, specialist and elective teachers, other non-classroom instructional staff, extra help, other instructional staff, professional development, instructional materials and equipment, student support, and administration). The purpose of the framework is to illuminate how resource-use patterns are tied to instruction. As we near the end of our first year of this study, we are currently implementing this phase of our data collection and analyses. We started with the most recent version of the expenditure framework, which the authors have field-tested in Arkansas (Mangan, Odden, Picus, Aportela, Rolle, Archibald, et al., 2006), Washington (Mangan, Odden, Picus, Gross, Fermanich, & Rudo, 2006), and Wyoming as well as on a national-level (Odden, Goertz, Goetz, Archibald, Gross, Weiss, & Mangan, 2008). The key difference with our study is that we are not using the framework to determine school finance adequacy as was done in those statewide studies. Instead, we are using the framework as a structure for determining the current resources within the school, and tying those resources to instruction for the purpose of improving teaching and learning. We are also comparing this information to

the finance data at the district level with the goal of integrating the systems so that each level would have all the data pertinent to decisions about use of resources for school and system improvement.

With the help of colleagues on our research team<sup>2</sup>, we expanded the framework by adding school-human resource indicators, school-social organizational indicators, classroom-financial indicators, classroom-program indicators, classroom-human resource indicators, classroom-social/organizational indicators, student-level financial indicators, student-program indicators, and student-human resource indicators. Table 1 specifies these additional elements.

Table 1. Additional Indicators Added to School-Level Expenditure Structure

Indicator Sub-Category	IRIS Indicators
School-Human Resource Indicators	Percent Core Teachers
	Teacher Turnover or Retention Rate
	Percentage of Classrooms Taught by First-Year Teachers
	Principal Experience, Professional Development, & Assignment History
	Principal Instructional Leadership
	Induction, Mentoring, or Similar Programs for New Teachers
School - Social/ Organizational Indicators	Safety
	Discipline
	Professional Community
	Collective Efficacy
	Relational Trust
	Academic Press
Classroom-Financial Indicators	Instructional Materials & Curriculum
	Actual Teacher Salary
Classroom-Program Indicators	Content Taught
	Instructional Practices
	Class Size by Subject
	Class Length by Subject
Classroom-Human Resource	Teacher Education
	Teacher Experience
	Teacher Certification

<sup>2</sup> Allan Odden, Anthony Milanowski, and Jeff Watson

Indicators	Teacher Professional Development History
	Teacher Assignment History
Classroom - Social/Organizational Indicators	Classroom Demographic Composition
	Classroom Climate
Student-Level Financial Indicators	Tutoring by Certified Teacher
	Attend After-School or Summer School Program
	Visit a Special Education or ESL Resource Room
Student-Program Indicators	Courses Taken
	Teachers from Whom Instruction Has Been Received
	Schools Attended
	Participation in Specific Programming
	Over Time, Minutes of Instruction in Core Subjects
Student-Human Resource Indicators	Standard Student Demographics
	Student Special Needs
	Diagnostic and Summative Test Scores
	Student Home Location

We specified data definitions for each IRIS indicator.

The first step in our data collection efforts was to meet with district level personnel who head the finance, professional development, technology, and human resources departments. These district-level decision makers were our entry point into assessing the capacity of data systems already in place to track IRIS indicators. As outsiders, we had the opportunity to assess the way the various databases connected on a macro level as well as how specific school-level resource data could be gleaned from the systems.

With this introduction from district-level staff, we organized our data collection implementation plan into three parts. First, we identified where each data element in the school level expenditure framework was housed in the district databases, and if they were not available, determined where we would have to go to find that information. This required us to learn about other data systems supported by the district (e.g., human

resources, student information systems, survey systems, professional development, and finance). We not only located the district database where each element was located, we highlighted the data elements within the databases that corresponded to the IFAS data elements and noted the district definitions for each data field. It was important to collect these definitions as they did not always parallel the IFAS definitions, and we would often have to pull information from more than one database to get the desired data element. This represents the beginning of the work on systems integration that is essential to the success of the IRIS project.

In the second phase of our data collection, we tested our revised framework with individual schools to cross reference what we discovered in our data element search. We identified these schools in conjunction with the VARC staff who had been working with a matrix of schools in Milwaukee, with the axis including high and low attainment schools intersected with high and low value-added schools. The sample we chose is represented in Table 2.

Table 2. School-level Sample Organized by Performance and Value-Added Results

	Low Value-Added	High Value-Added
High Attainment	2 Elementary*	1 High School* 1 Middle School
Low Attainment	1 Middle School	1 High School* 1 K-8*

\*Interviews have been completed at starred sites

During the third phase of data collection, we interviewed principals to gather an in-depth story of how each of these schools had attempted to improve teaching and learning. The purpose of this was to link the way schools were using resources with how they approached improving student performance. The open-ended questions we asked were originally developed as part of a successful district study in the state of Washington (Mangan, Odden, Picus, Gross, et al., 2006). They were intended to gather information on curriculum and instruction (i.e., content focus, curricula, instructional vision, assessments, instructional implementation) as well as detail on resource use for improving student performance (i.e., early childhood programs, full-day kindergarten, class size reduction, professional development, interventions for struggling students, parent outreach or community involvement, and technology). The interviews ended with questions regarding initiation of the improvement effort, instructional leadership within the school, accountability, and identification of resources need to sustain and expand their efforts.

The data from these case studies will be analyzed according to the sampling quadrant in which they fall. We want to know if schools whose staff members have been more successful at fostering student growth are taking different approaches to resource use and instructional improvement compared to those schools whose staff members have been less successful at fostering student growth.

In year two, once school-level resource data is identified, we will link it to educational services and instructional strategies that can, in turn, be linked to students<sup>3</sup>. This can be achieved by using statistical modeling techniques to identify factors that have

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an impact on student learning gains, holding a variety of other factors constant at various levels of the education system. Odden, Borman, and Fermanich (2004) have outlined the conceptual framework for these analyses. The problem has been that the data needed to clearly link financial, program, human, and social/organizational resources to student achievement have typically not been collected systematically and thus cannot be included in many, if any, analyses. Using IRIS, districts and states that adopt this model will have the ability to collect the kind of data needed for “what works” analyses, such as: uses of resources by educational strategy at the school level, provision of professional development resources at the district and school levels, teachers’ instructional practices and measures of the content that teachers actually teach, and school-level factors such as the degree of professional community, instructional leadership.

### **Systems Data Analysis**

After implementing our data collection plan in the fall of 2008, we have determined the current state and location of school-level data available within district databases. These systems are typically connected through complex extract, transform, and load statements and manual processing. Like many large districts, the way in which these systems are connected is driven by specific administrative functions. For example, Figure 1 shows the relationships of three different systems (SIS, HR, and Finance) within a process used to track teacher appointments. The identification of data elements within each and among these databases will be discussed in a forthcoming paper where we map out these data points.

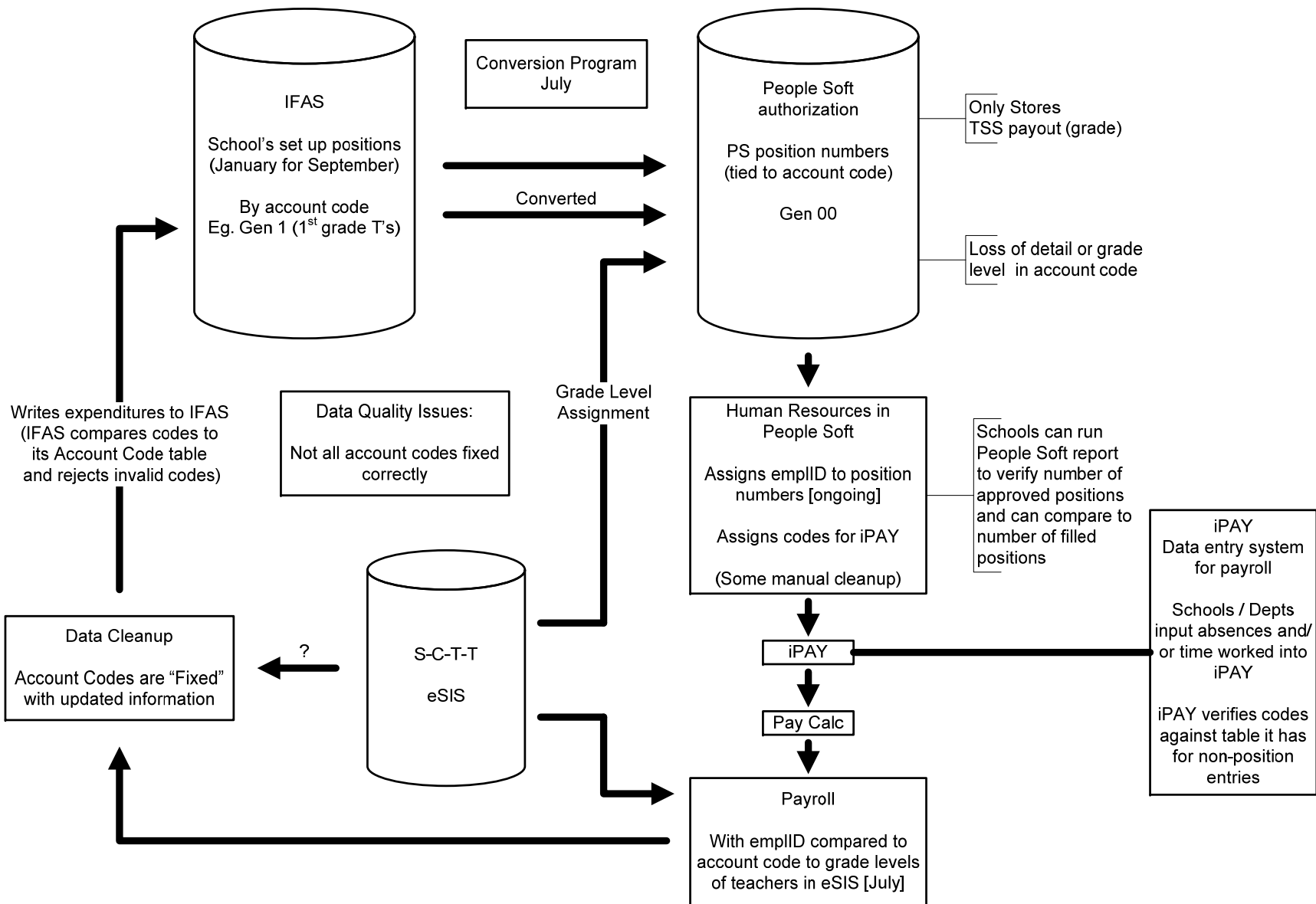


Figure 1. Integrated Financial and Administrative Software (IFAS) to PeopleSoft Teacher Appointment Workflow

#### **IV. Preliminary Findings and Conclusion**

The purpose of this project is to help create and support an integrated resource information system. We do not want to create redundancies, nor do we want to create more work for building-level staff. Our end goal is to provide a system that will help school leaders make informed instructional decisions that benefit teaching and learning.

Our initial district interviews revealed many of the conventional findings about large school districts. Departments are largely siloed, and the finance and technology departments operate more from a compliance perspective than as a partner in support of student learning, likely because this is how they have always been expected to function. Also, particularly because the district was designated a district in need of improvement, it is not surprising that finance and technology staff time is so heavily dedicated to compliance. Further, one of the partners needed to help change the culture of finance and technology to a team working to support instruction is the Office of Instructional Leadership and Supervision (OILS), and the vacancies in that department have made it difficult to take on that challenge.

The first school we visited was a charter school that was friendly to our efforts. We interviewed the principal, collecting information about school-level resource use that included exactly how each staff member's time was used. Through this process, we learned pieces of information about how district-level initiatives played out in schools. For example, the district has a math teacher leader initiative, in which it offered to place a math teacher leader in each school for one year. However, schools got to decide whether to accept this new staff position or designate an existing staff member as the math teacher leader. This decision could have implications for how that position is used—the extent to

which, for example, the math teacher leader in a school is available for instructional coaching as opposed to teaching a section of students—a level of nuance that is not necessarily captured with district budget data, but the level that is necessary to tie these initiatives more directly to improvements in student learning.

Indeed, to fulfill the goals of creating an integrated resource information system, resource use data will have to be tied to students. This is the last phase of our project. We want to tie resources to individual student need. It is part of a cutting edge initiative to provide each student, regardless of special education designation, the resources s/he needs. It is actually a preventative approach wherein struggling students receive help without qualifying for an individualized education program or a 505 plan.

### **Next Steps**

Now that we have completed the first run at determining a suitable school level expenditure framework, the next step is to pull the data for one school from the district databases we identified and compare it to the data that we collect through interviews with the principal of that school. This is essentially a test to find out if the data elements we identified do in fact provide the information we are looking for, and it will also determine the accuracy of the information in those databases. This is one way to ensure construct validity of our data.

Once we determine what is currently available through district databases, we can confidently address the data gaps. These gaps will then be either collected school-by-school through interviews or surveys, or we will suggest changes to the current databases.

We are optimistic that IRIS will successfully link resource data with student learning needs. This has never been accomplished in a large urban district setting, and we are excited to be a part of the effort.

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