MAKING THE CASE FOR REGIONAL DATA WAREHOUSING IN EDUCATION

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AN INTRODUCTION TO REGIONAL DATA WAREHOUSING IN EDUCATION

Many states are beginning to realize the power of combining their longitudinal data systems with other similar, but disconnected data management and delivery systems to provide the critical foundation for education reform. Regional education data warehouses are a promising infrastructure to knit together the scattered landscape of data management systems used at state, district and municipal levels. This effort could provide answers to critical policy questions, enable robust research, and engage expertise beyond educational department to integrate additional information sources. If well-conceived, it can create a shared, unifying mission to support your goals, such as student-centered learning and increased student achievement.

> **Implementing a data warehouse and the resulting access to comprehensive data involves changing how districts make decisions, and then grounding decisions in data.**

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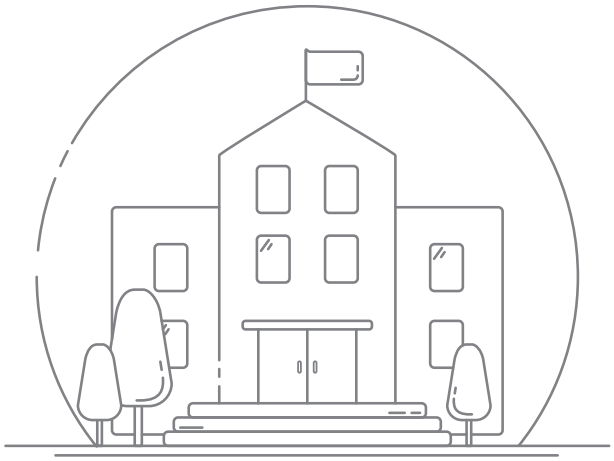
About the Author

Marcy Lauck plans, organizes, and directs SCCOE's projects relating to data governance, and serves as the SCCOE liaison to the Silicon Valley Regional Data Trust. She brings 20 years experience in education data warehousing, and in guiding strategic institutional change and data-based quality management processes. She supports the identification, prioritization and scoping of education data strategies to inform the SCCOE and SVRDT's strategic direction, including facilitating the collaboration of experts from a broad range of sectors.

THE BACKGROUND OF EDUCATION DATA WAREHOUSING

When the No Child Left Behind (NCLB) Act of 2002 required every state report the results of state assessments in reading and math and to separate these scores by ethnicity, socioeconomic status,disability status and English Proficiency, many states began to implement data management systems to help them organize, integrate and analyze annual data to inform their progress in improving educational outcomes for all students. With the 2009 American Reinvestment and Recovery Act (ARRA) and the Race to the Top (RTTT) challenge, meant to spur systemic reform and innovative practices in America's schools, federal funds were made available to support the development of statewide data systems to improve student achievement. Consequently, "as of November 2013, 48 of the 50 states have now built and implemented K-12 longitudinal data systems."[1] Many of these systems were developed prior to ARRA and RTTT, and were initially designed to meet NCLB federal compliance and mandated reporting requirements, providing information about the effects of educational programs, curriculum and instruction on student achievement. Data flowed from the district, to the state, to the federal government, and required precious local resources with little to no return on local investment. Unfortunately, data rarely flowed back to districts except in the form of the required annual district-level data reported on state websites which were rarely timely and lacked sufficient scope and granularity to support local, data-driven decision-making efforts.



Educational Data Warehousing Timeline

2002 NCLB	2009 ARRA + RTTT	2013 State Data Warehouses	2015 ESSA
No Child Left Behind required every state to report the results of state assessments.	**Reform via American Reinvestment and Recovery Act and the Race to the Top challenge.**	**48 of the 50 states now had longitudinal data systems.**	**Every Student Succeeds Act expanded the measures of accountability systems.**

As a result, they did not support the on-the-ground, student-centered analysis that would be beneficialto local districts. Lacking access to high quality state data, many forward-thinking districts created their own data warehouses. While these systems often had a powerful impact on local efforts to improve student outcomes, two conditions created an imbalance in the education ecosystem:

1. Discrepancies and disconnects between the information available in state longitudinal data systems and local data warehouses.

2. A lack of access to quality data for districts without sufficient resources to implement data warehousing technology.

WHY REGIONAL EDUCATION DATA WAREHOUSES? WHY NOW?

"Metropolitan regions — the collections of cities, suburbs, and rural areas that house two-thirds of America's population — are increasingly wheretransformation takes shape."[2] Given the importance of building local capacity to enact change, state and regional leaders should plan to implement a system with multiple, interlocking pieces that can better inform local data-driven decisionmaking rather than one over-arching longitudinal data solution. Positioning regional education service centers as providers of robust data warehouses would serve to connect state and district-level efforts, while providing immediate local value to districts.

According to the Association of Educational Service Agencies, there are 553 regional education services agencies nationwide. Each agency varies in scope and size, but traditionally provides collective services to member school districts, in areas that the school districts alone would not be able to adequately and equitably provide. Your regional education service center most likely already has collaborative links with state departments of education as well as the leadership framework, local research capacity, and long-term strategic focus to take the lead in pooling resources and integrating planning, coordination of services, and alignment of professional development activities necessary to successfully create a regional

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warehouse. Most regional offices leverage partnerships and resources to provide a broad array of services that include long-range educational planning, professional development, technology services,administrative support services and state and federal agency liaison services.

- In Wisconsin, for example, "the Cooperative Education Service Agencies make it possible for schools, regardless of size, to work together to share staff and equipment, save money and extend educational opportunity to all corners of the state and to all kinds of children."[4]

- In New York, Boards of Cooperative Educational Services (BOCES) help school districts save money by providing opportunities to pool resources and share costs.[5]

- Chicago's Chapin Hall and the Chicago Consortium on School Research are premier examples of this regional approach: "Discerning the most crucial questions to investigate, building a cumulative knowledge base, and bringing findings to bear on local policy and practice all require focus on a single school district or geographic location."[6]

In addition to the organization that regional centers provide, the technology and data infrastructure demands are also more manageable at a regional or state level. Many of the state longitudinal data systems were not designed to address the operational challenges of near-real-time data processing or to process the enormity and granularity of records that enable actionable intelligence

at the classroom level for the entire state. "As data warehouses grow, a number of issues begin to crop up. Time to process data becomes quite lengthy. Tables [of data] become so large that the time it takes to query them becomes excessive. Support for indata base analytics overtaxes the available server resources."[7] These key concerns, as well as security requirements and data-sharing agreements, could be more easily addressed at a centralized data warehouse, bridging the state systems' reporting needs with the front-line student- and teacher-level data that local districts need to manage their improvement goals. Providing a database architecture and data model that can accommodate the increasing volume of data and continue to provide timely, vital insights will help ensure the success of these efforts.

Looking forward, the Every Student Succeeds Act (ESSA) will continue to drive the need for connected data insights. The required accountability metrics under ESSA necessitate analysis of often disparate systems. A regional warehouse that combines these sources could prove to alleviate manual, time-intensive annual reporting. Additionally, making these reports visual and accessible year-round can help monitor progress and encourage achievement of goals.

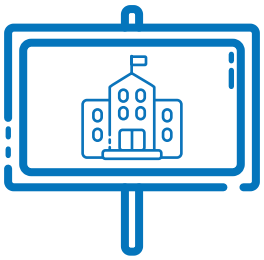
ADVANTAGES OF REGIONAL DATA WAREHOUSES

Strategic use of regional education data warehouses would advance regional education agendas in the following ways:

A Broader Base of Data

Unlike municipal data sets tied to social services, public health, juvenile justice, early childhood providers, workforce development etc., education datasets, tied to compulsory education laws for all children, are more inclusive of all children in a community. Using K-12, charter and private school data as foundational datasets would be a strong first step in creating a comprehensive central repository that, when combined with other municipal datasets with appropriate securityprotocols, could inform regional policy-driven research and practice and lead to better outcomes for children.

Equitable Access

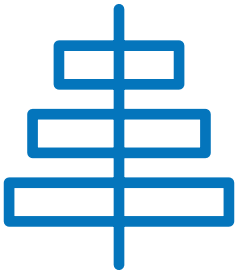


Creating centralized, regional repositories, with the granularity of information necessary to address persistent and pressing education issues by linking to the education core of classroom teaching and learning, can ensure equitable access to high quality data for all districts and schools in the region, regardless of size and resources.

Efficiency and Cost Savings

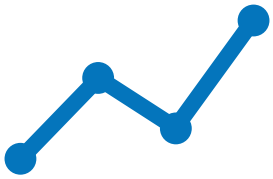
Building a regional data warehouse can realize significant cost savings and enhance collaborative efforts through the use of a shared data model, standard data definitions, and centralized data storage. Developing such a system of shared infrastructure coordinates resources and spreads costs among regional players so that smaller, less resource-rich districts would be able to benefit from and contribute to regional efforts to support greater student attainment.

Alignment



Aligning the regional warehouses with the state's longitudinal data system will support system interoperability and common data standards. Organizations such as the Postsecondary Electronic Standards Council (PESC) and Schools Interoperability Framework Association (SIFA) have been central in creating Common Education Data Standards (CEDS) for linked education data systems

Integrated Data Systems



Delivery systems in such varied areas as health, education and criminal justice often do not or cannot share information in a way that could improve services, both for individual children and on a larger scale. "Conversations on P-20/Workforce data systems now include linking education to other systems, such as foster care, health and human services, juvenile justice, early childhood, and workforce, to better align programs and services to meet an individual child's needs and, in turn, improve child well-being and academic achievement."[8] Supporting timely integration across these systems will not only result in better service delivery for children, it will also help policymakers answer critical policy and program questions about "what works, for whom, and at what cost."[9] Regional Centers could lead critical efforts to help define uniform data sharing agreements that ensure that students' personally identifiable information is protected and secure, and that using student-specific data across agencies is possible when appropriate and necessary.

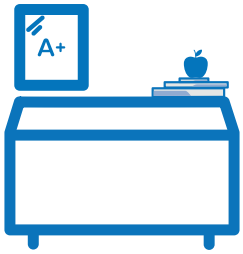
Security and Privacy

While individual student privacy must not be compromised, the regulations described in FERPA are not meant to be an insurmountable barrier to sharing data between systems. Ensuring role-based security and appropriate privacy protections for student data will enable trusted collaborations among service providers committed to addressing the educational needs of children.

Real-time Access

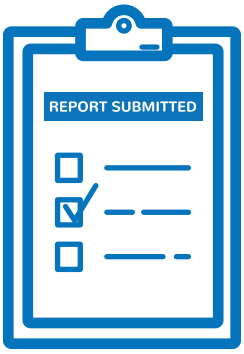
Regional warehouses have the capacity to provide teachers, administrators, parents, and community stakeholders with real-time access to more granular information on how students are progressing. Often the latency and limited scope of information provided in state longitudinal data systems impedes local use. For example, attendance data–key to assessing student engagement–may be reported in the aggregate on state data systems. Local efforts to increase student attendance, however, require daily and period attendance to discern root causes of student absence. Timely access paired with reports that foster improvement will help to drive data use, build support for the system, and inform policy changes.

Professional Development



Regional centers already provide professional development to their districts. Housing the region's data warehouse would enable the centers' trainers to gain valuable regional perspectives on school and district progress. Additionally, these regional experts could provide capacity-building services to schools and districts on how to use data analysis tools, analyze diverse sources of data, and translate their understanding into action. This training could be developed and delivered through regional data initiatives in a variety of formats to provide administrators and teachers with hands-on opportunities and follow-up support to use data effectively.

Research Capacity



Partnerships between the regional service centers and local university and research entities have an important role to play in regional efforts to support data-intensive research into the factors impacting student outcomes. Researchers are well positioned as regional partners to determine the appropriate research methods and design studies to address complex policy issues, to advise on regional development of early warning and college readiness indicator systems, and to provide analytic expertise that informs the centers' efforts. The development of these partnerships is timely. In as much as the education ecosystem is experiencing fundamental changes, "the social sciences are also undergoing a dramatic transformation from studying problems to solving them; from making due with a small number of sparse data sets to analyzing increasing quantities of diverse, highly informative data; from isolated scholars toiling away on their own to larger scale, collaborative, interdisciplinary, lab-style research teams; and from a purely academic pursuit focused inward to having a major impact on public policy, commerce and industry, other academic fields, and some of the major problems that affect individuals and societies."[10] Combining the knowledge and skills of researchers and the expertise of teachers and administrators with robust, integrated data systems can assemble

CONDITIONS FOR SUCCESS

The context in which these technology tools are embedded iscritical to their successful use and implementation. From Collective Impact initiatives to regional efforts like the National Neighborhood Indicators Project and the STRIVE network data provide a central lever to drivepolitical and social will. By providing the essential data necessary to establish key indicators and to inform systemic change, regional educational data warehouses become the foundational building blocks required to support true, 21st century education reform.

HOW HOONUIT CAN HELP

With over a century of combined experience in the education space, the Hoonuit team is committed to partnering with districts to create intuitive, educator-focused analytics programs that consistently drive positive student outcomes. Our advanced data models integrate with existing SIS, financial, HR and many other systems (including generic dataloaders), providing educators with unimaginably granular analyses at the student, school, and district level.

Furthermore, Hoonuit's best-in-class predictive machine learning and statistical modeling approach leads the education industry in precision, accuracy and performance as a result of utilizing the broadest data set, optimizations to minimize under and over identification of students, and ability to update our actionable indicators on the most frequent cycle in the market. This allows us to highlight students who are getting flagged on short-term indicators and take action immediately.

Most importantly, our customer-centric approach enables us to provide unparalleled service. To learn more about how Hoonuit can help you create a productive, data-driven culture, click here.

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