

Data Tsunami: Turning Information Chaos into Useful Insights

An Education Whitepaper

We've reached a new tide in the world of data. With the explosion of the Internet of Things (IoT), more and more devices are connecting over the internet and could generate up to \$11.1 trillion a year in economic value by 2025¹. Big Data firms are saying that more data has been created in the last two years than in all of human history² with IoT powering this massive expansion. The K-12 education sector is not immune to its own version of this flood of data. Whether serving students in a small rural school district or a mega-sized city, K-12 educators are faced with an unwieldy amount of data to try to make sense out of, while simultaneously trying to achieve greater results with fewer resources.

Shuffling through documents, file folders or disconnected applications for a specific piece of data in the information chaos is an enormous time drain for already tapped-out staff. And, of course, the inability to use critical information like attendance, discipline, assessments or profile information from the student information system (SIS) in a timely manner can negatively impact student success and district performance indicators.

The Data Expansion in Education. How Did We Get Here?

The explosion of learning applications, data systems and the prolific creation of data began in 2002 with No Child Left Behind (NCLB)—legislation which emphasized data and measurement. This put enormous pressure on schools to collect and report data to state and federal regulators. Where student data hadn't been comprehensively documented before, with NCLB, it became a requirement to capture and transmit student data. Over the last 15 years, the growth of assessment data, in particular, has increased with the introduction of national and state learning standards, and online testing. The race to measure student performance and teacher efficacy has schools creating more and more data that is often unusable. Add to this the abundance of new learning apps in the classroom—many of them offered at no cost and not sanctioned by the information technology (IT) department. This has created the tidal wave of education data and there is no sign that it will abate. With 73% of teachers believing that data helps validate where their students are and where they can go³, the information chaos must be controlled and turned into useful insights.

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Interoperability: The Rescue for K-12 Education

For IT stakeholders at most school districts, their top concerns are the security and usefulness of student and district data. Knowing what information is flowing through the district and being able to easily find it and make useful recommendations is critical for educators. It's important for districts to have the data-driven insights which can be the catalyst for changes to a student's education plan. And district-wide reporting can power decisions that can offer greater security protocols, program support and overall funding. This is why districts are leveraging interoperability technology solutions to manage the ever-increasing data and gain useful insights from their data.

Interoperability is broadly defined as the ability of different information technology systems and software applications to both bi-directionally exchange data and enable integration that can power analytics and reporting. Student data tends to sit in silos and usually follows the school districts' organizational chart. For example, special-education data lives with the special education office, assessment data resides with the assessment division, etc. When data is sitting siloed and not shared, the full picture of students and the district are unclear. Consider a few examples of how an interoperability solution can benefit educators and administrators:

- » **Learning Analytics:** Imagine being able to deliver personalized reporting and analytics for teachers, students and administrators with data from multiple vendors and applications all working together. Interoperability allows your data to be exchanged in a flexible, managed environment with detailed assessment results, grades, discipline data, attendance and more.
- » **Assessment Results:** Bring together formative, summative and interim assessment results so you can better support students who might need interventions to enhance academic performance. Imagine connecting those assessment results across multiple assessment platforms, aligned to learning standards, for a deeper understanding of student mastery.
- » **Teaching and Learning Tools:** Create a full view of student progress with data from teaching and learning tools that might not be from the same vendor.
- » **Compliance Reporting:** Deliver efficient, up-to-date data for compliance reporting, from a consolidated data source which is the "single source of truth."

73%
of teachers believe that data helps validate where their students are and where they can go.³

"If we have better data about our students, we can more quickly provide the services that are critical for their success or diagnose previous educational strategies that did not work. We can enhance their educational process and target-in on their strengths and weaknesses when we have better and historical data."

Don Wolff, CIO, Hillsboro School District, Data Connect User



Why Standards Matter?

Data standards are the rules by which data are described and recorded. In order to share, exchange, and understand data, there must be some standardization to the data format as well as the meaning. Using a data standard can make the job of an IT director easier, knowing that each piece of data is clearly defined and used consistently across all schools—even data being generated from multiple applications. But more importantly, utilizing a data standard can give school districts an edge knowing that if they change applications or vendors, their data and analytics will be preserved. They are not locked into a proprietary data model, which reduces long-term investment and gives them the power to make decisions that will be scalable and sustainable for the future.

An everyday example of a standard is an AA battery. Let's say you need a new battery for your television's remote control. You know that you can purchase any brand of an AA battery and it will work because they are produced to a standard.

With data and K-12 education, an example of a data standard is the Ed-Fi® Data Standard. It's defined as a set of rules for the collection, management, and organization of educational data that allows multiple systems to share their information in a seamless, dynamic way. To illustrate, with a common data model, a district can develop a standard definition and data structure of a student, teacher, course or assessment outcome. Regardless of the source of the data, the common data model uses the same language to describe that data, facilitating easier reporting across disparate data sources. Ed-Fi, sponsored by the Michael and Susan Dell Foundation, provides a data structure and language with a centralized Operational Data Store (ODS) and a secure API. This set of technologies allows a district's data to be brought together seamlessly—both for analytics that relies on data from multiple systems and for all those situations where one system needs access to data from another system. With recent researchers reporting that 74% of districts are already using more than 26 different edtech or software tools⁴, it's likely that the number of district applications and their complexity will continue to expand. Planning for a scalable and sustainable future is becoming increasingly important for today's school district.

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Ed-Fi streamlines data management in school districts and states across the country with its Data Standard, ODS and API. It offers a single point of integration for districts and vendors, alike, to connect educational data systems.



Creating a Beacon for Accuracy

The risks of poor-quality data, data breaches, and duplicate data are high and very expensive. Districts and state education agencies (SEAs) spend millions annually on student information systems, software, hardware, IT staff, assessments and many other aspects of data system management. Besides student-related data systems, investments are made in transportation, health, food services and library data systems, among others. Without a coordinated, systemic data governance program, it is easy to collect both redundant and contradictory data across these various programs. A data governance program establishes the policies and processes within which data is standardized, collected, securely stored, analyzed, shared and used – all while protecting individual privacy and confidentiality.⁵ A data governance plan or some basic data management guidelines for all stakeholders to adhere to can go a long way in establishing confidence in the district data.

Key Considerations When Choosing an Interoperability Solution

To be successful, stakeholders must choose the right solution that solves the immediate business need and can also scale for the future deluge of data that is sure to arrive. But which approach will work for your district?

Some districts are considering a “build your own” approach. There is a tremendous amount of support through the Ed-Fi Alliance for those who wish to tackle building their own solution. A do-it-yourself project will require a team of technical experts who can provision and manage the ODS and keep up with regular Ed-Fi updates. To consider this approach, you will want to ensure you have team members with advanced skills in MS Windows, Visual Studio, ASP.NET, MS SQL Server and more. Visit the Ed-Fi Academy Website or attend the Ed-Fi Technical Congress and Bootcamps to learn more.

Another alternative is hiring a consulting firm or systems integrator to develop a customized Ed-Fi instance for you. As with any consulting venture, you’ll want to explore the firm’s past success in creating this type of a solution and find out how you can maintain the investment should the consulting agreement not work out in the long term.

An additional option that is taking off is the Data Connect interoperability platform by Certica Solutions. This flexible option gives school districts a low-risk choice to purchase an annual subscription license to a hosted and fully-managed solution. How does it work? It’s simple. Data Connect ODS setup is managed by Certica and allows districts to connect applications like their student information system, assessment programs, special education systems, learning apps and more, with a hub-and-spoke architecture for bi-directional data sharing. Data Connect is powered by Ed-Fi Technologies (Data Standard, ODS, API) and can easily export data from the ODS for analytics and reporting. Certica’s team of Ed-Fi experts can provision an ODS in minutes and manage all Ed-Fi updates. Think of this option as a plug-and-play interoperability platform giving school districts deep data insights and relieving IT of the burden of building and maintaining data infrastructure.

A data governance program
establishes the policies and processes within which data is standardized, collected, securely stored, analyzed, shared and used.⁵

"Data consolidation for reporting purposes was a big challenge. Our goal with all our systems was to give staff more time and to be more efficient with their decision-making. We chose Data Connect because it was turnkey and met our needs. Instead of devoting resources to building something, we're putting resources into refining reports and getting data in front of people. I can now spend more time educating people on what the data is and what's behind the data."

Tim Cariss, Director, Assessment & Accountability, Data Connect User

Gain Control of Your Data

Given the expanding amount of data in every district, along with the need to do more with less, an interoperability solution that addresses current and future needs is the new imperative for today's education stakeholders. Having the full picture and bi-directional data sharing can make all the difference in exceeding goals, better supporting student needs and meeting parent and community expectations. Interoperability options are becoming more prevalent in the K-12 sector—the difference lies in how you want to approach and manage the new wave of data and exciting potential insights. With forward-thinking product development and decades of experience solving complex data problems for more than 300 school districts, Certica Solutions is uniquely qualified to support your efforts.

References

- 1 McKinsey, Unlocking the Internet of Things, 2017, <https://mckinsey.com/business-functions/digital-mckinsey/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world>
- 2 Domo, Data Never Sleeps 5.0, 2016, https://domo.com/learn/data-never-sleeps-5?aid=ogsm072517_1&sf100871281=1
- 3 Teachers Know Best – Making Data Work, 2015 http://www.teachersknowbest.org/reports/making_data_work
- 4 Digital Promise, Data Interoperability in Education Report, 2017, http://digitalpromise.org/wp-content/uploads/2017/08/DataInteroperability_Final.pdf
- 5 Nancy Smith, Ph.D., Datasmith Solutions, LLC, Data Governance: What is It and Why is It Important?, 2018, <https://certicasolutions.com/data-governance-important/>

Certica is the innovator of the Certica Connect™ Platform-as-a-Service which provides application interoperability and centralized integration, access and enrichment of education data, metadata and content. The company partners with a diverse network of K-12 application and system vendors, as well as learning content and assessment providers. Certica also delivers solutions directly to more than 600 school districts and numerous charter school organizations, state education agencies and educational service agencies.

Ed-Fi is a registered trademark of Ed-Fi Alliance, LLC.

Resources

Data Connect

Certica's Data Connect™ interoperability platform, based on the Ed-Fi Technologies, is specifically designed for school districts to integrate data between applications with a minimum of effort and IT support. <https://certicasolutions.com/products/data-connect>

Ed-Fi Alliance

Sponsored by the Michael and Susan Dell Foundation, the Ed-Fi Alliance is a group of educators, technologists, and thought leaders shaping the future of education technology through the Ed-Fi Data Standard and the ecosystem of Ed-Fi Technologies. <https://www.ed-fi.org>

Consortium for School Networking (CoSN)

CoSN is a professional association for school system technology leaders providing thought leadership resources, community, best practices and advocacy tools to help leaders succeed in the digital transformation. <http://www.cosn.org>

Project Unicorn

Project Unicorn is an effort to improve data interoperability within K-12 education. Project Unicorn is an educational advocacy initiative dedicated to the secure, controlled interchange of data. <https://www.projunicorn.org>

Data Quality Campaign

Data Quality Campaign is a leading voice on education data policy and use. Their goal is to increase public understanding of the value of education data. <https://dataqualitycampaign.org>

Glossary

API: An application programming interface (API) is a set of protocols, routines, functions and/or commands that programmers use to develop software or facilitate interaction between distinct systems.

Data Governance: Data governance establishes the policies and processes within which data is standardized, collected, securely stored, analyzed, shared and used – all while protecting individual privacy and confidentiality.

Ed-Fi Data Standard: A set of rules for the collection, management, and organization of education data that allows multiple systems to share their information in a seamless, actionable way.

Ed-Fi Technologies: A set of technologies including the Ed-Fi Data Standard, API and ODS.

Hub-and-Spoke Architecture: Data architecture featuring a persistent data store (hub) which consolidates data from multiple integrated applications (spokes). This is the architecture used in the Ed-Fi operational data store and API.

Internet of Things (IoT): The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems.

Interoperability: The ability of different information technology systems and software applications to bi-directionally exchange data and integrate data to power analytics and reporting.

Operational Data Store (ODS): An ODS can be used for integrating disparate data from multiple sources so that business operations, analysis and reporting can be carried out while business operations are occurring. This is the place where most of the data used in current operation is housed before it's transferred to the data warehouse for archiving, analytics and reporting.

Point-to-point Integration: A simple integration of data between two directly connected applications.