State Education Leadership Interoperability

Leveraging Data for Academic Excellence

SETDA

ABOUT SETDA

Founded in 2001, the State Educational Technology Directors Association (SETDA) is the principal nonprofit membership association representing US state and territorial educational technology leaders. Our mission is to build and increase the capacity of state and national leaders to improve education through technology policy and practice. For more information, please visit: www.setda.org.

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ABOUT THIS PROJECT

In 2013, SETDA's Transforming Data to Information in Service of Learning publication profiled 14 interoperability initiatives to raise awareness around the lack of common data standards and interoperability issues in K12 education. As interoperability issues evolve, SETDA and its members and their colleagues continue to lead initiatives to promote best practices for student learning. With support from the Michael & Susan Dell Foundation, SETDA collaborated with the Ed-Fi Alliance to host a symposium regarding state interoperability efforts. A cohort of nine state teams, in conjunction with private sector leaders and content experts engaged in a focused discussion on the challenges,

successes, and future needs to support interoperability in state K12 education. State teams included both academic and technology leaders. In order to have a robust conversation and to make the in-person event more meaningful and effective, SETDA and Ed-Fi hosted two pre-symposium webinars to introduce the project, establish symposium goals and launch discussions. To facilitate continuing discussions, SETDA developed an online space for participants to collaborate, share resources, and engage in dialogue both before and after the symposium.

This publication highlights how state leaders tackle data interoperability with the emergence of data standards for student information, assessment, digital content, and other educational applications. While states are at various maturity levels for interoperability, each state shares goals for interoperability, the drivers for those goals, current status and use cases, as well as some of the challenges in the process. Private sector partners share observations, perceptions of states' status in the interoperability process, as well as some of the pain points from the vendor perspective. State and private sector leaders identify recommendations and the next steps necessary to continue the conversations within states, among states, and with the private sector to develop cohesive data interoperability practices to achieve student learning goals.

State Teams

- Delaware
- Georgia
- Michigan
- Nebraska
- North Carolina
- Oregon
- Utah
- Wisconsin
- Wyoming

Private Sector Partners

- AEM Education Services
- Amazon Web Services
- Class Link
- D2L
- Ed-Fi Alliance
- Eduvate
- IMS Global
- Midas Education
- NWEA
- US Department of Education

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EXECUTIVE SUMMARY

State leadership is fundamental for developing a shared vision and empowering leaders within the state and across states to ensure all students are prepared for college and careers. It is critical to engage state leaders across departments, such as curriculum, assessment, technology, budget and special education in collaborative planning discussions to develop an interoperability plan that supports the vision and goals of the state agency and includes the capacity to achieve those goals. It is equally important that state leaders, especially in technology and instruction, share ideas and resources across states, as interoperability is not a "single state" issue. Vendors also play a pivotal role as partners in developing interoperability solutions and helping leverage best practices across states. It is important to continue the conversations within states, among states, and with the private sector to develop cohesive data interoperability practices to achieve student learning goals.

> While states, districts, and schools have long collected certain data for accountability purposes, leveraging data to help guide decisions about instruction, school administration, and operations is still a challenge.

Recommendations

State leadership is essential for developing interoperable solutions that support the best future where data is seamlessly connected and readily available for decision makers. Many states are applying interoperability solutions to existing practices, but not yet applying interoperability solutions to transform current practices to support new learning models with seamless access to data. SETDA recommends that states consider the following recommendations.

Leverage ESSA

ESSA implementation provides an opportunity to drive change as systems need to be interoperable and able to easily share data. Leveraging ESSA data reporting requirements drives interoperability efforts.

Establish Data Governance Structure

Establish a data governance board and/or comprehensive data governance structure within the state departments of education and with external partners, including the legislature, higher education and other state agencies.

Develop a Flexible Implementation Plan

Engage in a collaborative planning process with leaders across departments to develop a flexible interoperability implementation plan.

Share Best Practices

Share best practices, ideas and resources with state colleagues and encourage district collaboration, especially in technology and instruction.

Encourage Stakeholder Buy-In

Stakeholders and decision makers need to see the value of data to support student success. Encourage broad buy-in by ensuring open and regular communication and providing value back to data users.

Collaborate with Districts

Collaborate with districts for the implementation of interoperable data systems and applications. Include district leaders in future plans for interoperability, including discussions of shifts in state policies and new interoperability initiatives. Establish clearly defined goals and timelines so that districts can adequately prepare to meet state requirements.

Communicate with Vendors

Develop an open communication plan and working relationship between states and vendors. States should be sure to communicate a strategic vision and plan for the implementation of interoperable data systems and provide significant lead time and support for technical developments and changes.

> *"Without an interoperability implementation plan and buy-in from stakeholders, it is difficult to maximize the use of data for student learning."*
>
> –Patches Hill, Director & CIO Technology,
> Delaware Operations, SETDA Member

1. BACKGROUND

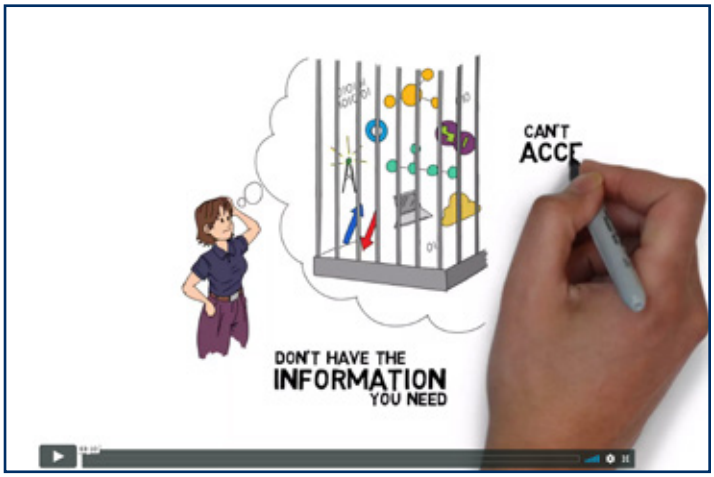
State leadership is essential for developing a shared vision and empowering leaders within a state and across states to ensure all students are college and career ready and prepared for living and working in the digital age. It is critical to engage state leaders across departments from a variety of roles, such as curriculum, assessment, technology, budget, and special education, in collaborative planning discussions to determine how interoperability can support the vision and goals of the state agency and the capacity to achieve those goals. It is equally important that state leaders, especially in technology and instruction, share ideas and resources across states, as interoperability is not a "single state" issue. As more and more students move from state to state, the seamless sharing of student data presents additional challenges related to the security and privacy of student data. The Privacy Technical Assistance Center (PTAC) is a resource for educators to learn more about data privacy, confidentiality, and security practices. Another resource is the State Exchange of Education Data (SEED) that enables participating states to track, monitor, and share information for students who transfer across states. Vendors also play a pivotal role as partners in developing interoperability solutions and helping states leverage best practices across states. It is important to continue the conversations within states, among states, and with the private sector to develop cohesive data interoperability practices to achieve student learning goals.

What is Interoperability?

Interoperability is the seamless, secure, and controlled exchange of data between applications. Interoperability allows data to easily flow among applications that are developed for different purposes using a standardized vocabulary, structure, and cadence. One commonly understood example of interoperability systems and standards is Bluetooth – a short range wireless standard that allows devices to communicate with one another. Phones can connect with wireless speakers via Bluetooth to play music or they can connect with the navigation system in a car to allow phone calls to be made by voice command. The phones, speakers, and car all built their products to align to the Bluetooth standard so that the devices could speak the same language in order to work together.

> Integration is not interoperability

Conversely, connecting systems and applications for the sharing of data that requires a separate application to translate the data is integration and not interoperability. In this case, the systems or applications don't share the same language and cannot "talk to each other" without another application that understands both languages and can translate. For example, a French speaking person communicates with a Russian speaking person through an interpreter who understands both languages.



Learn more about interoperability in schools by viewing this video produced by the Michigan Data Hub.

Common Data Standards

A variety of student data sets help educators, parents, students and/or policymakers make decisions. Types of student data may include demographics, assessment results, teacher observations, student created content, attendance or course grades. The Data Quality Campaign, What is Student Data? identifies eight requirements necessary for data to be useful to improve student success–data must be available, complete, relevant and secure. Additionally, educators must have the skills to effectively use data; communicate how schools and students are doing, support educators, and improve student learning.

Data Standards
Set of rules for the collection, management, and organization of educational data that allows multiple systems to share their information in a seamless, actionable way.

While individual data points provide useful information, they do not provide a complete picture of the student unless connected. Common data standards facilitate connecting these data points and require just one integration point rather than hundreds of points based upon a product's input and output processes. Some of the benefits of common data standards are the consistency and flow of the data, as well as the ability for real-time access. There are multiple data standards, and in some instances, the different data standards work well together and in other cases the data standards conflict with one another, presenting challenges for states and districts (see Appendix B). All education leaders should be aware of the various data standards and plan on the implementation of standards that work best to meet student learning goals.

Why Interoperability?

- ✓ Without interoperability, student information cannot be transferred seamlessly, disrupting student progress.
- ✓ States and districts incur significant costs and staff time trying to integrate systems that are not interoperable.

The systems we use to collect, manage, analyze and report on data are often disconnected and don't work well together. Most states have systems from multiple vendors and their districts have additional systems and applications which historically have had limited or no underlying data standards. In these cases, most systems/applications have their own internal model and integration methods that require a patchwork of connections at the state and/or local level. Consequently, there are gaps in the integration and interfaces among disparate applications and many of these systems and applications are not interoperable. Ideally, data from multiple products such as a learning management system, a student information system, and learning object repositories will be aligned to the same common data standards.

In local control states, districts often acquire different systems and applications to best meet the specific needs of their teachers and students. Choosing the best system for a district is ideal—ensuring that those systems are interoperable is vital. Without interoperability, districts may incur

significant costs and staff time trying to integrate systems that are not interoperable. Additionally, the disparate systems pose limitations in achieving optimal functionality to support data driven decision making. The ability to easily update and add future applications can also be extremely difficult. Systems that are not interoperable force leaders to make decisions between desired functionality to support education objectives and the bottom line impact to budget.

What is the Best Future State?

Data is powerful when used to support teaching and learning opportunities. It is important to use data beyond reporting requirements and efficiency improvements to support academic excellence for all students. Interoperability is not just about improving efficiencies by connecting data systems and reducing manual data entry or improving the consistency of data, it is about connecting different types of data points to present a full picture of student learning.

Policymakers use academic data, such as graduation rates to inform policy decisions. Administrators use attendance and behavior data to adjust course schedules. Teachers use data to inform instruction and students use learning applications for deeper understanding of content. Parents access student data, such as grade reports, to help students make decisions about future courses. In the best future state, student data will be seamlessly incorporated by all stakeholders to support the ultimate goal of student success.

Think Big

Think beyond improved efficiency of existing data issues; instead, how interoperability can drive predictive analytics by "democratizing" data.

–Amazon Web Services

2. INTEROPERABILITY IN ACTION

Interoperability empowers leaders to build comprehensive solutions that meet the needs of their specific populations by building, adjusting, and improving the right mix of systems with confidence that they will be able to connect and share appropriate data to meet state and district goals. State academic and interoperability goals focus on improving student success, personalizing instruction, improving data collection and reporting, safeguarding data security and privacy, ensuring portability of student data, and improving states' ability to assess efficacy of education technology products. The following use cases show a sampling of how interoperability helps states and districts achieve student learning goals.

> Need to standardize student roster information so that students can gain access to digital content in a timely manner on Day 1 of school.
>
> –ClassLink

Student Information Transfer Use Case

Today is Bobby's first day at Good Day High School, he is a transfer student starting halfway through the first semester of his sophomore year. Bobby's old high school used a student information system (SIS) that helped his school keep track of admissions and transcript information as well as provide important information to his teachers and parents about his grades, attendance, discipline, and progress. New Day High uses a different SIS vendor, but thanks to the interoperability policies in the state, Bobby's information seamlessly and securely moves with him. State interoperability policies include using Common Education Data Standards, which define how data should be formatted for optimal integration. Without these interoperability policies, important information, such as library, food service, and transportation would not be seamlessly transferred to the new school. This is especially important for Bobby as he has a disability that requires special transportation services. On his first day at Good Day, Bobby's bus picks him up and he arrives at school on time, reducing stress for both Bobby and his family. Bobby also qualifies for free and reduced lunch and does not encounter any issues at lunchtime.

- ✓ *Student record transfer from one student information system to another for transcripts, attendance, and discipline*
- ✓ *Interoperability of data systems for special education and food services*
- ✓ *Connection of student data systems with financial data systems*

Data Collection and Reporting Use Case

Since the state uses a common education data standard, the district can automatically absorb Bobby's data from his prior district without human intervention. The next month, New Day High School submits a quarterly report to the district that includes Bobby's information. The district does not need to request data from his prior school, facilitating reporting. The district easily compiles the reports from all schools without worrying about errors since the systems are interoperable.

- ✓ *Transfer of data from one school to another though student information system*
- ✓ *Compliance reporting--includes data quality, rules engines, and error checking*
- ✓ *Aggregation of data for comprehensive reporting on district and school progress*
- ✓ *Aggregation of data into a single data store--data lake or data warehouse*

Assessment Systems: Data Backpacks Use Case

The state education agency recently launched an initiative to support "data backpacks" for all students. This allows Bobby to easily and securely take and share work from his old school with his new teachers, including digital artifacts from his recent science fair project and classroom assessment results. The backpack allows Bobby's new teachers to have a better picture of what Bobby knows and can go beyond the single test score of his last statewide assessment.

- ✓ *Student data backpack transfer from one Learning Management System (LMS) to another*
- ✓ *Mastery and competency tracking system in LMS*
- ✓ *Assessment of learning from multiple data sources*
- ✓ *Efficient integration of assessment data with other key student data using Ed-Fi's Assessment Outcomes Management API specification*

Personalized Learning Use Case

The personalized learning initiative also provides teachers with access to dashboards powered by data fed from disparate sources via the Ed-Fi data standard and APIs, a suite of tools that help consolidate and streamline the sharing of student data and also provides the data insights that help teachers better understand the individual needs of students in their classrooms. Ms. Hall, an algebra teacher, reviews the results of a recent quiz she gave after introducing a new concept. She quickly notices that a student who is usually a high performer did poorly on the quiz, did not turn in the last two homework assignments, and has been tardy or absent quite a bit over the last two weeks. She makes a note to herself to talk with this student to better understand what other factors may be impacting her performance. Using the new technologies in place, Ms. Hall can digitally send the student additional work through the LMS that might help her get back on track and, if necessary, reach out to her parents.

- ✓ *Access to learning management system dashboard*
- ✓ *Identification of student need through LMS*

College and Career Planning Use Case

The New Day Independent School District just launched a new strategic plan that includes an effort to personalize learning for all students. This effort includes providing a student-centered dashboard to Bobby and his classmates. Jan, a Junior at New Day High, is excited to use the new dashboard to keep track of assignments, collaborate with her classmates, manage her last couple of years in high school, and plan for her future after graduation. With the dashboard, she can access supplemental materials to enhance her mastery of

content. In addition, through the student dashboard, Jan recently completed a career interest profile that matches her interests with specific careers. She was surprised to find out that she prefers careers with practical, hands-on activities. Upon self-reflection, Jan decides to take a culinary class next year instead of another elective which she could register for within the dashboard.

- ✓ *Mapping learning outcomes to higher-ed fields of study*
- ✓ *Mapping student interest to career planning system*
- ✓ *Timely adjustment of course schedule*

Learning Object Repository Use Case

The state's Learning Object Repository (LOR) contains quality instructional content curated by subject matter professionals. Content may be locally authored by educators around the state, purchased by the state, or imported from trusted partners through a tool such as the Learning Registry. This tool allows recognized SEA's to share Open Educational Resource (OER) metadata with one another for eventual placement in their LOR. Options for sharing could include automatic transfer using semantic web protocols, or with a CSV import/export; and because the contents' metadata has been standardized and systems are in place for the cross walk of academic standards (using ASN, IMS Global CASE-compliant tool, or similar), the consuming SEA will not be required to manually edit content records before making them available to the public.

- ✓ *Curation of content by subject matter professionals*
- ✓ *Common metadata schema used in initial resource description*
- ✓ *Automatic sharing of metadata and transfer of metadata automatically*
- ✓ *Crosswalk of academic standards and alignment to resources in the learning resource repository*

Quality Digital Content Use Case

Ms. Hall searches her state's learning object repository (LOR) to find an appropriate video that meets the learning standards and content. When looking for a resource, she can look at the ratings and reviews to ensure that it is a quality resource. She can add the video to the school's learning management system (LMS) so that Jan can access it from anywhere. This process is easy for Ms. Hall since the district utilizes the IMS Global Learning Consortium Specifications. IMS content, application, and data standards enable teachers to mix and match educational content and software from different sources into the same learning platforms.

- ✓ *Access to high quality resources from learning resource repository*
- ✓ *Integration of resources seamlessly into learning management system*
- ✓ *Access to quality content in learning management system by different states*
- ✓ *Management of open and proprietary content in learning management system*

3. INTEROPERABILITY CHALLENGES

A common challenge is a lack of understanding on the importance of interoperability throughout the state agency. As state departments of education evolve, the value that interoperability plays in helping efficiently scale ideas, personnel, and solutions is invaluable. At the district level, states are striving to transform their image from a compliance and regulatory perception to one of technical assistance and support. Another major challenge for states is that districts often don't understand the importance and need for interoperability and can be reluctant to adopt data standards and interoperability solutions. Without an interoperability implementation plan and buy-in from stakeholders, it is difficult to maximize the use of data for student learning. Key challenges in technology, academics, human capacity, policy and budget/ procurement are discussed in the following section.

Challenge

District adoption is a challenge because of the implementation curve. To the degree districts see adoption of the data standards as more work than doing things the way they already have, this issue is not likely to get better any time soon.

Technology

Some of the technology challenges center around data standards, including inconsistency of standards and the ability to access data in a useable format. It is also a challenge for states to maintain the latest versions of data standards. Often, states don't have the staffing resources to update data collection activities or the ability to implement standards' updates in a timely manner. States struggle to move from batch to real-time (API) data, negatively impacting efforts to personalize learning for students. States and districts may have different interoperability agreements and use different standards, making it difficult to harmonize state and district interoperability efforts. Vendor reluctance to adopt interoperability standards and change their product can also become an obstacle when developing interoperability solutions. Another challenge is obtaining data from vendors in the format the school needs and that vendors often don't share interoperable data with each other. Lack of access to reliable, high-speed broadband connectivity affects implementation and maintenance of data systems.

Solution

Wisconsin leverages the Ed-Fi framework to utilize a common format for the learning management system that allows courses from any vendor or content developed in-house to be mixed and matched.

Academics

As states, districts, and schools access quality digital content from a variety of resources, the crosswalk of curriculum standards across states present challenges. Teachers cannot easily use a resource as a primary instructional tool if the curriculum standards are not clearly defined in that resource. The process for the selection of curriculum

standards and frameworks and the revision process for curriculum standards are often cumbersome. Teachers lack professional development opportunities around these new/changing curriculum standards. Another challenge in using and sharing student data is the change to competency-based learning from traditional graduation requirements.

Solution

Standardize the metadata and develop systems for crosswalking academic standards using ASN, IMS Global CASE-compliant tool, or similar.

Human Capacity

A significant challenge for states and districts is communicating to stakeholders the power of using data to inform instruction and support student learning. Equally challenging is ensuring that teachers have the professional development and training necessary to effectively use data to personalize learning for all students. Convincing teachers that using data to personalize learning will be easier and reduce their burden can be difficult. Staffing turnover and the lack of human capacity to keep up with evolving technology applications and solutions is another challenge. It is difficult to find the time and resources, as most of the work around data is compliance driven and department specific. This is especially true in small districts and rural schools.

Solution

Nebraska's interoperability implementation plan reduced the financial and human capacity burden on districts while increasing the quality and timeliness of data with the opportunity to use data to support state learning goals.

Policy

Lack of interoperability policies and implementation plans present challenges for both states and districts. The influence of lobbyists often drives policy decisions that may not be what states and districts want or need. Convincing policy makers on the value proposition of interoperability solutions to drive student learning goals is another challenge when crafting policies. Policy makers tend to focus on compliance and monitoring rather than student learning when they consider data solutions. Making the connection between the data collection process and the use of data for student learning is imperative. The need for interoperability policies and the coherence around basic data standards is a challenge for vendors and hinders innovation and creativity in products.

Solution

Michigan's interoperability plan ties directly to their ESSA goals and statewide initiative to be a top 10 education state.

Budget/Procurement

Funding for new technology and dwindling budgets are a constant challenge for states and districts. Eliminating the "technical debt" for existing non-interoperable systems is another expense when developing interoperability solutions. The procurement process provides an opportunity to include data standards requirements in requests for proposals. Project Unicorn, an initiative to improve data interoperability within K-12 education, encourages districts to only procure vendor tools which meet a quality threshold of fidelity for data exchange. However, if the requirements are the union of every stakeholder's wish list, it is a challenge for vendors to support numerous overlapping standards which can become expensive, high maintenance, and likely unused. Validation of vendors' alignment with established and emerging standards: compliance vs. conformance vs. certification vs. proprietary approach is a challenge for states and districts. While the requirement of vendors to adopt a particular approach is a disruption of business models for companies.

Solution

Oregon is promoting Project Unicorn, as an effort to improve data interoperability in K-12 education through the procurement process.

4. STATE SNAPSHOTS

The following state snapshots present a short synopsis of where states are in the process and how they are developing and implementing interoperability solutions.

Delaware

Delaware is in the early stages of tackling interoperability at the state and district level. Delaware was an early adopter of the Ed-Fi data standard at the state level while districts are adopting the IMS Global standards. Both Ed-Fi and IMS Global standards can be effectively used together. A primary issue that Delaware is facing is how to work with existing vendor applications within the state that use differing technologies and data standards. Delaware is investigating ideas for taking the next steps for interoperability that unite the needs of state data collection and warehousing with district goals for digital content to personalize learning.

Georgia

Georgia created a Statewide Longitudinal Data System (SLDS) that includes most of the applications that districts need. Georgia decided that it was easier to build this integrated system internally than to purchase vendor products. The SLDS application uses the IMS Global QTI standard for assessment and the IMS Global LTI standard for integrating digital content and student information systems. Any subsequent applications that need to interface with the SLDS system can be integrated using current interoperability standards. Georgia's Total Learning Architecture project, a statewide open ecosystem build on technical standards, enables a blend of traditional, virtual, personalized and competency-based learning. This open total learning architecture is an evolving set of standardized web services to facilitate sharing of essential data between applications. Learn more about this project by watching this video. In addition, Georgia is using the SEED application that allows participating states to track, monitor, and share information for students who transfer across states. SEED utilizes the CEDS standards. Georgia developed, operates, and maintains the centralized point of exchange for routing requests and responses for information related to transfer students for participating states in SEED.

Michigan

The Michigan Data Hub is the primary effort to tackle interoperability, which addresses the issue in three ways. The first is between local district data systems, the second is from the district data systems to the state data systems, and the third is from state data sources back to the local district level. Michigan is currently mapping the Statewide Longitudinal Data System and data collection efforts to the CEDS standards and to Ed-Fi where it is beneficial. The P-20 Data and Information Management office is reviewing all data systems to identify where duplication of data can be eliminated. Michigan is also exploring ways to make more information available via a single sign-on (SSO) utilizing a master person index at the state level and the data hub SSO at the local and regional level.

Nebraska

In Nebraska, a quest for interoperability started initially with a goal of providing an integrated near real time dashboard for teachers in addition to a study on Education Data Systems. Now known as ADVISER (Advanced Data Views Informing Student Educational Response), the project utilizes the Ed-Fi® technologies, data model, and API to begin the interoperability with student information systems, assessment systems, and includes special education systems. In addition, Nebraska is working to implement *Generate* (a project funded by the Office of Special Education (OSEP) through the Center for the Integration of IDEA Data (CIID). *Generate* supports the creation of data files required federal submission to EdFacts. In addition, using the Ed-Fi® Operational Data Store (ODS) Nebraska has been working to support the district submission of the Civil Rights Data Collection (CRDC) reporting. Work continues to broaden the role of interoperability with other systems that support the Teaching and Learning process for students including the Single Sign On (SSO), application launch portal, academic advancement plan (for interim program schools), systems involved students, school financial data, and other systemic supports.

North Carolina

North Carolina uses a mandated enterprise statewide student information system that allows automatic transfer of student data across districts. The state also utilizes CEDS as the basis for the data dictionary for the state SLDS. Additionally, a statewide single-sign-on solution has been implemented which utilizes a unique ID for both students and staff. Therefore, data collections and data transfers between districts and with external partners are less challenging, yet there is a need to establish interoperability standards to be used across statewide applications and/or local applications to ensure that all systems can communicate seamlessly. Furthermore, North Carolina, through the Digital Learning Plan Initiative, has identified the need to provide a data dashboard which will include digital content usage data to enable district and state leaders to better understand how teachers are utilizing digital tools to improve student outcomes.

Oregon

The Oregon Department of Education (ODE) is committed to taking steps in furthering its ability to use data to inform decision-making and increase opportunities for student success. As part of its 2017-19 Agency Strategic Plan, ODE is currently assessing ways in which it can more effectively simplify and streamline data collection and state reporting processes, as well as improve transparency and facilitate data use by all education stakeholders. Through this work, ODE, in conjunction with many statewide technology leaders, is promoting Project Unicorn, as an effort to improve data interoperability in K-12 education.

Utah

Utah currently maintains the UTREx/Data Clearinghouse that gathers and stores student data from schools. Utah has a statewide credentialing system, professional learning system, and a longitudinal data system. Utah is considering adopting a statewide data standard, developing a statewide student information

system that includes a dashboard to facilitate use of the data. Utah is also currently piloting a student data privacy application vetting protocol which would engage a select group of district leaders across the state in vetting applications with the eventual goal of establishing a list of vetted applications that this consortium would curate.

Wisconsin

Wisconsin's primary focus on interoperability is on administrative student data leveraging the Ed-Fi framework. Wisconsin's digital learning plan recommends the use of a common format for the learning management system that allows courses from any vendor or content developed in-house to be mixed and matched. Wisconsin utilizes an Ed-Fi enabled API and is currently working with an academic and career planning software system vendor to make the API bi-directional. This process will eliminate manual file transfer, improve the data quality, and eliminate the latency of the data transfer. Wisconsin plans to work with learning management systems and assessment vendors to develop future API certifications. Wisconsin is also adopting technical interoperability standards to ensure the seamless sharing of content and services among systems and applications.

Wyoming

Wyoming continues to explore interoperability opportunities at the state and school district level with successful SIF (A4L) implementation that enables different applications to share data, as well as for reporting over the last decade. A large number of school districts in the state are working with the Wyoming Department of Education (WDE) and the Ed-Fi data standard for administrative data, which recently moved from the pilot stage and into production environment.

5. RECOMMENDATIONS

State leadership is essential for developing interoperable solutions that support the best future state where data is seamlessly connected and readily available for decision makers, teachers, parents, and students. Many states are applying interoperability solutions to existing practices, but not yet applying interoperability solutions to transform current practices to support new learning models with seamless access to data. SETDA recommends that states consider the following recommendations.

Leverage ESSA

ESSA implementation provides an opportunity for states to promote and expand their interoperability efforts. As evidenced in ESSA, national leaders are recognizing the benefits of technology to support student learning. Technology is woven throughout the legislation, including assessment, accountability, and school improvement. The Center for Digital Education's Guide ESSA, EdTech and the Future of Education policy handbook provides insight into the changes in ESSA related to technology. ESSA supports professional development and capacity building for technology, encourages the use of technology in comprehensive approaches to teaching and learning, and provides states and districts with the flexibility to include technology in a range of initiatives. Since each title within ESSA supports personalized learning with technology, consider pooling statewide set-aside funds to engage in coordinated interoperability activities. Michigan's ESSA plan goals directly link to the need for interoperability. Legislative priorities, such as Early Literacy legislation, need the seamless transmission of data from the districts to the state and back to the districts with minimal effort and duplication. Georgia is leveraging open standards that promote the use of learning technologies that can then be used to embrace the whole child as outlined within the state's ESSA plan. Delaware is in the process of redesigning data systems and applications to support districts that are focusing on using data for personalized learning. The ESSA implementation provides an opportunity to drive this change as systems need to be interoperable and easily share data to effectively personalize learning.

> Personalized learning requirements in ESSA can help drive change and leverage interoperability

Establish Data Governance Structure

Establish a data governance board and/or comprehensive data governance structure within the state departments of education and with external partners, including the legislature, higher education, and other state agencies. A data governance structure ensures that there is a process for the collection, quality, and security of data. It also can guide decisions on how to use data within the state and with external partners, as well as how data is reported. *The Art of the Possible: Cross-Agency Data Governance Lessons Learned from Kentucky, Maryland, and Washington* profiles the data governance of three states, and how these states have broken down data silos to use data to support educational and workforce goals.

Develop a Flexible Implementation Plan

Develop a flexible interoperability implementation plan and engage in a collaborative planning process with leaders across departments. As states build this vision and develop an interoperability implementation plan, they should include leaders from a variety of disciplines, including curriculum, assessment, technology, finance, special services, and professional learning in the process.

- Chief Education Officer
- Superintendent
- Chief Academic Officer
- Chief Information Officer
- Chief Financial/Budget Officer
- Curriculum
- Instructional Materials
- Library Media Specialists
- Assessment
- State Reporting
- Digital Learning
- Virtual Learning
- Application Developers
- Data Research
- Title I/II/III
- Special Education
- Career Technical Education
- Professional Learning

> Encourage states to develop a strong theory of action and framework so that ongoing work is planful, but flexible as technology and promising practices evolve.
>
> –Eduvate

Share Best Practices

Share best practices across states and districts and encourage district collaboration, especially among leaders from a variety of disciplines, including curriculum, assessment, technology, finance, special services, and professional learning. It is also important that state leaders, especially in technology and instruction, share ideas and resources across states, as interoperability is not a "single state" issue. As more and more students move from state to state, the seamless sharing of student data presents additional challenges related to the security and privacy of student data. The Privacy Technical Assistance Center (PTAC) is a resource for educators to learn more about data privacy, confidentiality, and security practices. Another resource is the State Exchange of Education Data (SEED) that enables participating states to track, monitor, and share information for students who transfer across states. Other states are developing interoperability best practices or hosting events around interoperability. North Carolina is exploring the idea of defining a "best of the districts" interoperability system description as a model for all districts to utilize. States are also conducting events to share current and future plans for interoperability within the state. Michigan hosts the #GoOpen summit and Wisconsin provides state and regional training sessions on interoperability for districts.

Encourage Stakeholder Buy-In

Encourage stakeholder buy-in so that stakeholders and decision makers see the value of data to support student success. Craft a story in "plain English" that all stakeholders can relate to and understand. This process will help leaders communicate how interoperability will inform instruction and support student learning. Equally important is to ensure that teachers understand how to use the data to personalize learning for all students. Another vital issue is student data privacy. In order to get support from parents, districts need to effectively communicate how the data will be used and how it will be kept safe. DQC, Future of Privacy Forum and Protecting Student Privacy all have excellent resources that districts can use to communicate with parents and students about data security and privacy. States are cognizant of districts' reluctance to overburden teachers with complicated dashboards to personalize learning as districts advocate for "no new work for teachers." Other approaches discussed include creating a line item in the budget for interoperability needs and requiring interoperability data standards in state and district contracts.

Collaborate with Districts

States must collaborate with districts for the implementation of interoperable data systems and applications even in local control states. With interoperability, local control districts can select the systems/applications that best meet the needs of their educators and students, yet easily share data among those systems and with the state. States have the opportunity to provide leadership and include districts in future plans for interoperability, including discussions of shifts in state policies and new interoperability initiatives; establish clearly defined goals and timelines so that districts can adequately prepare for any changes; and, work with districts to change district thinking about data systems and applications, emphasizing the importance of data to meet student learning goals and not just to satisfy federal and state reporting requirements. Wisconsin publishes interoperability standards as technical assistance for school districts to share with vendors and other partners. Nebraska uses the Future Ready Framework, which addresses interoperability, for the development of their digital learning plan. Georgia is focused on developing interoperable data systems that benefit as many districts as possible. Some states are going further than technical assistance and are providing guidelines for districts. State guidance, while not necessarily a mandate, can help districts with the procurement process for selecting data systems and applications. In these instances, states provide model language for districts to include in requests for proposals. Several states utilize the "bottom-up" approach by starting interoperability initiatives at the district level to address district data needs. States are working with districts to clearly define the "how" and the "what" and the need for a vision that aligns to what the districts value and what best benefits the district and their students.

> States provide technical assistance and services for small districts that often need the most help.

Communicate with Vendors

Develop an open communication plan and working relationship between states and vendors. States should be sure to communicate to vendors a strategic vision and plan for the implementation of interoperable data systems. Some states assist with logistics for meetings between vendors and

state and/or district personnel, while also helping vendors to stay on track with deliverables and timelines. Wisconsin has a great working relationship with their student information system vendors, as well as with their academic and career plan vendor. Nebraska also works on developing good relationships with their student information system vendors and encourages vendors to become Ed-Fi certified. Utah requires all vendors to certify data standards in their bids, simplifying the procurement process. Vendors encourage states to agree on a common standard or set of standards because critical mass drives effective standards and there is huge value in states collectively agreeing on a standardization approach. Vendors can then invest in higher value output rather than supporting multiple redundant standards.

> More evangelism is needed on this topic and there are lots of areas to leverage interoperability with multiple stakeholders.

Next Steps

- ✓ Conduct an inventory of state interoperability implementation plans to use as a basis for establishing interoperability maturity levels for each state
- ✓ Facilitate collaboration among states based on maturity level
- ✓ Share best practices across states and districts
- ✓ Collect examples of data governance structures and policies
- ✓ Continue the conversation with symposium participants and consider another in-person event, quarterly webinars, and/or creating an online community

APPENDIX A: NON-PROFIT ORGANIZATIONS SUPPORTING INTEROPERABILITY EFFORTS

Currently, there are several non-profit organizations that are playing a significant role in supporting the interoperability of education data.

- Access 4 Learning (A4L) Community, previously the SIF Association, is a non-profit organization of states, districts, schools, and vendors collaborating to develop interoperability solutions.
- Consortium for School Networking (CoSN) addresses the gaps in the integration and interfaces among disparate applications through blog posts and publications.
- Working Together to Strategically Connect the K-12 Enterprise: Interoperability Standards for Education helps district leaders understand why interoperability standards matter and highlights eight key areas of standards.
- Data Quality Campaign works to change the role of data and education by helping stakeholders understand the value of education data; have access to timely data; and the capacity to use data.
- Ed-Fi Alliance provides a data model combined with a tool suite that securely streamlines the sharing of student data. Ed-Fi Alliance also provides API certifications for vendors to enable educational technology infrastructure connectivity, ultimately meant to enable educators to gain insights on student academic performance.
- Education Information Management Advisory Collaborative (EIMAC), a CCSSO initiative, supports collaboration across states to ensure that technology and information are available to enhance decision-making and student learning.
- IMS Global Learning Consortium Specifications (content, application, and data standards) enable teachers to mix and match educational content and software from an ecosystem of several hundred certified products.
- Project Unicorn is an initiative to improve data interoperability within K-12 education by encouraging districts to demand/pledge to only procure vendor tools which meet a quality threshold of fidelity for data exchange. Project Unicorn also includes a focus on educating districts on the total cost of ownership when purchasing systems and applications.

APPENDIX B: ORGANIZATIONS DEVELOPING COMMON DATA STANDARDS

Currently, there are several organizations involved in the development and implementation of common data standards and tools to support interoperability. The following organizations have developed common data standards for education.

- Common Education Data Standards (CEDS) provides a common vocabulary and reference structure through a data dictionary and logical data model for information that needs to be shared across education organizations.
- Ed-Fi Data Standard is the widely-adopted, CEDS-aligned, open-source data standard. The standard provides API certifications for vendors to enable education technology infrastructure connectivity.
- IMS Global Learning Consortium Specifications provides standards for the following types of interoperability: digital content/curriculum, learning tools/apps/platforms, rostering/assignment/gradebook, e-assessment, learning analytics, and digital credentials/open badges.

Data Standards
Set of rules for the collection, management, and organization of educational data that allows multiple systems to share their information in a seamless, actionable way

- SIF Implementation Specification defines architecture requirements and communication protocols for software components and the interfaces between them. Every SIF Specification includes a set of XML schemas and the infrastructure for secure exchange of data.
- Experience API (xAPI) allows applications to share data about human performance. xAPI captures data on human performance in conjunction with associated instructional content or performance context information.

APPENDIX C: STATE DRIVERS FOR INTEROPERABILITY

The primary drivers for states' current interoperability efforts are centered around data quality, efficiency, timeliness, and sharing.

- ✓ Creating data collection efficiencies
- ✓ Enhancing data quality
- ✓ Reducing burden on districts
- ✓ Increasing timeliness of data
- ✓ Improving accuracy of data
- ✓ Enhancing transparency
- ✓ Eliminating data silos
- ✓ Increasing data sharing
- ✓ Reducing time between data origination and data use
- ✓ Connecting district/regional systems

APPENDIX D: STATE ACADEMIC AND INTEROPERABILITY GOALS

State academic and interoperability goals focus on increasing student achievement, personalizing instruction; and improving data quality and efficiency.

- ✓ Increase graduation rates
- ✓ Establish more career pathways
- ✓ Increase access to rigorous courses
- ✓ Increase ACT scores
- ✓ Increase summative assessment scores
- ✓ Implement personalized learning systems
- ✓ Use data to inform instruction
- ✓ Provide quality content
- ✓ Improve data collection efficiency
- ✓ Safeguard data security and privacy
- ✓ Ensure student data portability
- ✓ Provide financial data with school level information
- ✓ Create more accurate and timely state and district reporting
- ✓ Improve states' ability to assess efficacy of education technology products

APPENDIX E: GLOSSARY

Application Programming Interface (API): A set of programming instructions and standards for enabling software applications to interact with each other.

Data dictionary: A compilation of descriptive information about data elements that includes information such as what kinds of values a data element can contain, its relationships to other data elements, its origin, its usage, and its format.

Data element: a separate piece of information that can't be made any more granular than it already is, such as a last name or a birth date.

Data model or logical data model: A conceptual structure that defines both a language and the language rules to collect, compare, and work with a set of data. The data model doesn't collect data.

Data standard: An agreed-upon way to represent certain kinds of information for the purposes of simplifying data exchange.

Interoperability: The seamless sharing of data content and services between systems and applications.

Metadata: Information about a resource that describes it, such as what form the item takes, who created it, and who it's intended for. The use of metadata tags—details—allows a resource to be found or discovered.

Paradata: Descriptors that capture information about a resource's activities—how it has been used and by whom, including ratings of usefulness, alignment, and quality.

Schema: A diagram or outline for showing the structure of information. Many, but not all of the organizations discussed in this report use an XML schema for their data standards to provide a common way to communicate information. Multiple XML schemas exist. XML is a markup language (like HTML or JSON) for converting information into a form that can be interpreted by software; an XML schema therefore defines how that XML information should be structured or coded for use by software.

Web Service: A software program that performs a discrete amount of work and is designed to perform computer-to-computer interactions on a network, including the internet.

APPENDIX F: SETDA PUBLICATIONS SHOWCASING STATE LEADERSHIP

SETDA state leaders demonstrate leadership through the enactment of state policies, practices and innovative models. Recent publications include:

State Wi-Fi Leadership for Fostering Digital Learning Ready K-12 Schools. This paper explores the steps states are taking to address the wireless equity gaps that exist among their schools. Leaders from Illinois, New Mexico, North Carolina, and Utah outline the planning, policy, funding, and management approaches their state agencies or education technology leaders are adopting regarding Wi-Fi, and they share their recommendations for promoting and/or creating equitable access opportunities to high-quality Wi-Fi connectivity.

State K12 Procurement Case Studies. Developed in collaboration with state and district digital learning leaders, instructional materials directors, procurement offices and academic officers, this publication highlights state level procurement case studies that share how states have effectively established and implemented policies for the procurement of high quality instructional materials and devices. As the process for the acquisition and implementation varies widely from state to state, the case studies provide detailed information about the process in each state. These in-depth studies of California, Indiana, Louisiana and Utah provide road maps for other states that are moving forward to implement digital learning materials policies and procedures.

Digital Instructional Materials Acquisition Policies for States (DMAPS). Updated June 2017, the DMAPs website is an online database providing state and territory policies and practices related to the acquisition of digital instructional materials in K-12 education. This unique tool offers the opportunity to view details regarding individual states and national trends via an interactive map. The goal of this portal is to provide a clear picture of each state's instructional materials policies and practices to help encourage increased implementation of digital instructional materials.

Navigating The Digital Shift II. Implementing Digital Instructional Materials for Learning. SETDA expands upon the 2015 Navigating the Digital Shift report with a focus on living and learning in the digital age. In this second publication, stakeholders will learn about states' guidance and policies around the implementation of digital instructional materials as well as best practices.

Guide to Quality Instructional Materials. State, district, and school level leaders can use this guide to launch and maintain vetting processes for the selection of quality instructional materials aligned to standards. Key considerations, questions, and helpful hints are included throughout the guide. Additionally, the guide includes best practice examples from states and districts and national, state, and local resources to consider when selecting quality instructional materials.

State K-12 Broadband Leadership: Driving Connectivity and Access. SETDA and Common Sense Kids Action partnered on this report that highlights the powerful impact of state leadership in driving critical policy decisions at the national and state level to support broadband networks, bandwidth capacity, and home access for low-income families. Educators, policy makers, and the private sector will benefit from organized and accessible information regarding states' broadband and Wi-Fi implementation for all 50 states, Guam and the Commonwealth of the Mariana Islands.