



## Integrated Data Systems and Predictive Analytics in Higher Education

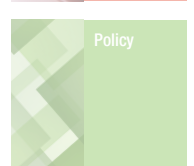
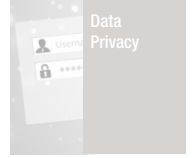
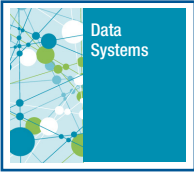
### Introduction

Over the past several years, SREB, in conjunction with its Education Technology Cooperative, has issued four policy briefs based on the 10 Issues in Education Technology: *Data Privacy and Security*; *Expanding Accessibility to Digital Spaces through Improved Policy and Practice*; *Emerging Technologies and New Learning Models that Engage Students*; and *Making the Connection: Digital Skills and Access for 21st Century Learning*. Each of these briefs connects two of the 10 Issues.

In this policy brief, we explore up-to-date information related to our final topics of the 10 Issues, data systems and predictive analytics. These issues operate in tandem in that predictive analytics are most helpful with the data housed in statewide data systems, and those data systems by themselves can only provide historical snapshots rather than helping to map out the future.

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## Data Systems in Higher Education

SREB recommends linking data systems between education and other sectors, from early childhood through college and workforce, and adopting common data definitions across the K-20 state education data systems. While linking these various data systems may seem intuitive, the process of working with various state agencies can be complex.

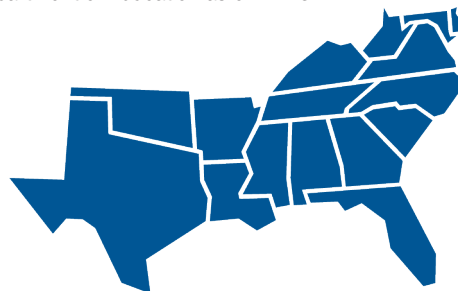
When state education agencies or higher education entities want to make data-based decisions, they must first have access to the data and know whether the data definitions are aligned across agencies or systems. One example of the need for consistent data definitions is the term *online education*. Data systems from sectors across states, or even from agencies within a state, may have different definitions for distance learning or online education. Some consider a course online if more than 50 percent is in an online format, while others call that a hybrid course or blended delivery. Others consider it to be fully online if it meets the 80 percent threshold, while others only consider a course to be online if 100 percent of the instruction is delivered online. Another example is the definition of *dual enrollment*, which is also called dual credit and, in some states, includes AP credit, early college, or other ways that students can get college credit during high school. In order to make broad comparisons, data definitions must be clear and consistent.

“Most states have developed statewide longitudinal data systems, which establish formal connections among systems from two or more of the following four core state agencies: early learning, K-12, postsecondary and workforce. Such systems make it possible to follow students’ progress from early childhood to career.”

Education Commission of the States, *Using State Data Systems*, 2019

In the education world, better decision making is a result of having access to data that spans a variety of sources. Using measures of student growth for educator evaluation and for accountability decisions, for instance, would be impossible without longitudinal data to quantify students’ progress over time on state assessments. Integrated data systems or longitudinal data systems allow agencies to analyze data and assess data trends across education frameworks, from early childhood education to postsecondary education and sometimes into the workforce. Many systems are supported through the U.S. Department of Education’s Statewide Longitudinal Data Systems grant program. The program allows for “grants and a growing range of services and resources” and has “helped propel the successful design, development, implementation, and expansion of... longitudinal data systems.” As of the FY19 competition period, all states in the SREB region have received SLDS grant funding.

**FIGURE 1:** States That Have Received State Longitudinal Data System Grant Funding through the U.S. Department of Education as of FY 19



Source: National Center for Education Statistics

## Then and Now

When statewide data systems were first introduced, schools, districts and states primarily used them to submit information for state and federal reporting requirements. As Carrie Conaway and others note, “This was originally accomplished through aggregate collections, with most states transitioning to individual student-level data collections with a unique statewide student identifier sometime in the early to mid-2000s.” As time passed and states began to recognize the usefulness of these datasets, many went on to build systems to collect information on educators and postsecondary student coursework and worked to link the datasets for further analysis. Now, the majority of these state-integrated data systems use unique identifiers that link student information from early childhood through postsecondary education and into the workforce.

## Benefits of Linking Data within Statewide Data Systems

The 2018 SHEEO Report on The State of Postsecondary Data Systems identifies these as the most valuable uses of data systems:

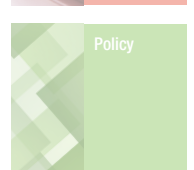
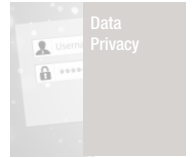
- Efficiency
- Public Data Resource
- Student Success
- Workforce and K-12 Connections
- Supplemental Funding
- Informed Policymaking

States that have these longitudinal data systems are able to efficiently manage data and reporting requests for the Integrated Postsecondary Education Data System. “State data systems allow SHEEO agencies to respond to policymaker requests for information quickly,” the SHEEO Report notes. “State data systems can answer questions about enrollment, retention, and completion across multiple institutions consistently. Having consistent data definitions between institutions across time makes interpretations and historical analysis easier.” These data systems are also considered a user-friendly way for the public to access data. Perhaps most important is the ability for researchers and policymakers to analyze trends and information on student outcomes and student success. In addition to providing information and data reports to high schools on postsecondary and workforce outcomes, the creation and use of data systems allows for collaboration between postsecondary education agencies and workforce development initiatives, thus fostering statewide economic development.

**TABLE 1:** SREB Region States with Longitudinal Data Systems

State	Data System	System Name
Alabama	In Progress	
Arkansas	Yes	<a href="#">Arkansas Research Center</a>
Delaware	Yes	<a href="#">Education Insight Dashboard</a>
Florida	Yes	<a href="#">PK-20 Education Data Warehouse</a>
Georgia	Yes	<a href="#">Georgia’s Academic and Workforce Analysis and Research Data System</a>
Kentucky	Yes	<a href="#">The Kentucky Center for Statistics (KYSTATS)</a>
Louisiana	Yes	<a href="#">Louisiana Believes</a>
Maryland	Yes	<a href="#">Maryland Longitudinal Data System</a>
Mississippi	Yes	<a href="#">Mississippi LifeTracks</a>
North Carolina	Yes	<a href="#">Common Education Data Analysis and Reporting System (EL/K12); Common Follow-Up System (PS/WF)</a>
Oklahoma	No	
South Carolina	No	
Tennessee	Yes	Measure Tennessee Longitudinal Data System
Texas	Yes	<a href="#">Texas Public Education Information Resource</a>
Virginia	Yes	<a href="#">Virginia Longitudinal Data System</a>
West Virginia	Yes	<a href="#">West Virginia Education Information System (EL/K12) Data Streams (PS/WF)</a>

Source: 2019 Education Commission of the States 50-State Comparison



## Moving Forward

According to the 2019 Education Commission of the States Report *Using State Data Systems to Create an Information Culture in Education*, state leaders and policymakers should consider several steps to make integrated data systems usable for a variety of audiences.

**Develop a vision:** Use the mantle of leadership to champion a coherent and compelling vision for education data.

**Foster coherence:** Forge stronger links among different data systems.

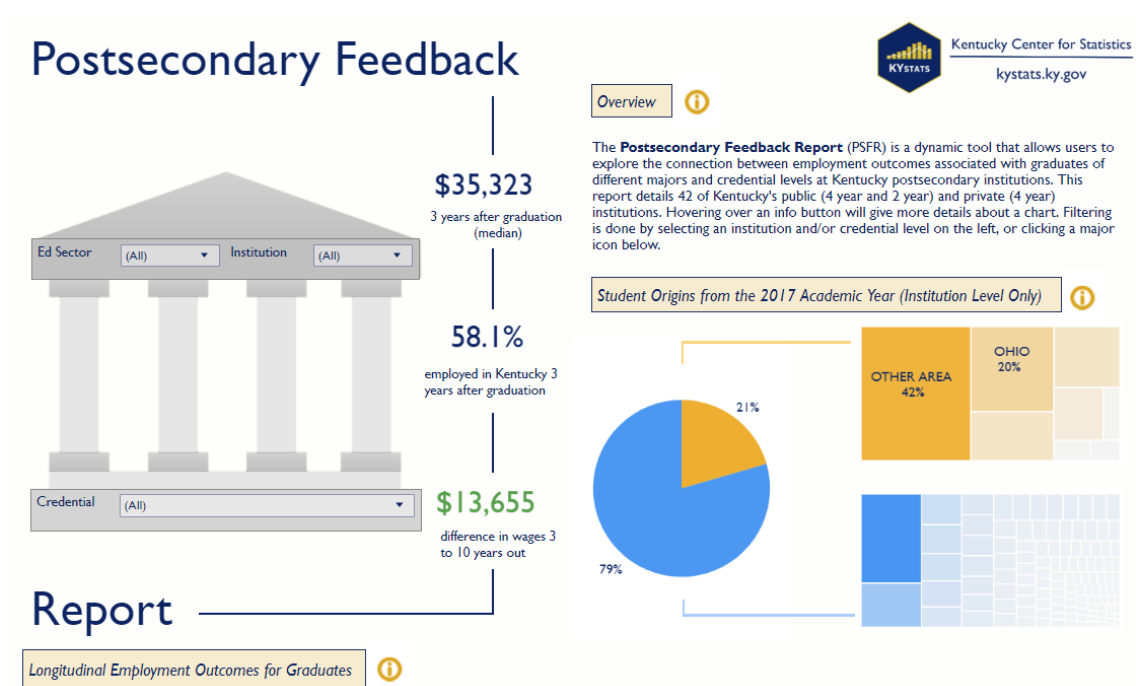
**Build capacity:** Build states' capacity to turn data into information.

**Improve access:** Ensure broad, public access to data and information with appropriate privacy protections.

**Increase funding:** Invest in making data and information a priority.

The report highlights several SREB region states and their efforts to move the needle on statewide data systems. For example, Kentucky has made strides in fostering coherence among siloed agencies. Many states operate numerous data systems on students that contain different information and may not be integrated or user-friendly. According to the Kentucky Center for Statistics, founded as a governing body that evaluates education and workforce efforts in the Commonwealth, "Data on a single resident of a state can be scattered across many separate systems maintained by different agencies governing areas as diverse as education, social services and workforce." KYSTATS develops reports, responds to research requests, and provides statistical data so that "policymakers, practitioners, and the general public can make better informed decisions."

FIGURE 2: Example of Postsecondary Reporting Using Data Systems



Source: [KYSTATS](https://kystats.ky.gov/)

The ECS report highlights Georgia, Tennessee and Texas as exemplars in efforts to build capacity around data systems. Georgia has a team providing training to every K-12 educator in the state on its longitudinal data system. Tennessee has developed a partnership with a university and other researchers to develop the Tennessee Education Research Alliance, in which access to the state longitudinal data systems allows for research on issues such as student outcomes. The Texas 2036 Strategic Plan includes free access to numerous statewide data sets. Its Education to Workforce Reporting tool “links public high school and postsecondary education data with workforce data to track the state’s progress in preparing students for postsecondary success and the workforce.”

While SREB states have made great strides in establishing data systems and common data definitions, the systems are only one piece of data-driven decision making. The data housed in these systems can allow states to use predictive modeling to inform outcomes and increase returns on investment.

## Predictive Analytics in Higher Education

### *What Is It?*

As mentioned earlier, the data compiled in longitudinal datasets is most often used to track students from early childhood education into postsecondary education. The data is also analyzed to determine historical trends, but few have the capacity to use historical data to predict future outcomes. SREB defines predictive analytics as the ability to use data for decision-making and predictive modeling of student-centric outcomes to improve education systems, processes and policy. Predictive modeling uses computer and statistical modeling of large data sets to make predictions about specific outcomes like postsecondary student success or college retention efforts.

Predictive analytics and modeling are most often used to drive decision making and, according to Zimmerman, to “inform future choices. Universities can use predictive analytics models to help with several agendas, from improving recruitment and retention to meeting students’ needs.” Further, Tristan Denley says that predictive analytic techniques move from a retrospective reporting data stance toward the use of large data sets to make detailed predictions about the future. These predictive models enable leaders to take strategic action to potentially provide significant improvements in the future.

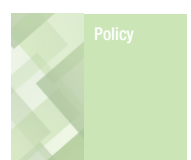
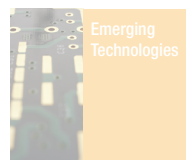
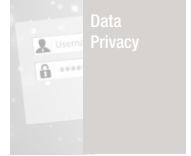
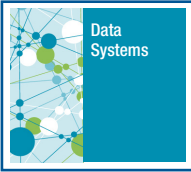
### *Why Is It Helpful?*

New America’s report *The Promise and Peril of Predictive Analytics In Higher Education* indicates that higher education institutes are using predictive modeling for three main purposes: identifying students most in need of advising services, developing adaptive learning courses that personalize learning for students, and managing enrollment.

**Targeted Student Advising:** Early-alert systems (helping identify students at risk of struggling academically) and program recommender (helping identify courses or programs for students) can help pinpoint students most in need of institutional support and allow staff and faculty to intervene to support student success.

**Adaptive Learning:** Using predictive analytics in adaptive learning platforms can help instructors more precisely pinpoint students’ learning deficits and customize their academic experience to align with how they learn best.

**Managing Enrollment:** Schools use this information to help forecast the size of incoming and returning classes. They also use it to narrow their recruitment and marketing efforts to target those students most likely to apply, enroll and succeed at the institution. Predictive analytics has also helped colleges anticipate the financial need of incoming and returning classes and predict whether a student will accept the financial aid award offered.



Beyond advising, adaptive learning, and enrollment management, higher education staff members are increasingly using data analytics to inform student success and retention. Colleges and universities can use data analytics to synchronize communication efforts between departments, help in degree planning, and merge student data with automated alerts to minimize any risks associated with the student.

### Who Is Using It?

Individual colleges and universities like the *University of Florida* are using artificial intelligence in combination with data analytics to track student's academic performance. The technology keeps students and faculty "up to date so they can be proactive in helping these students achieve their academic goals and then directing them in ways that will be consistent with their success." *Georgia Southern University* has been able to increase minority graduation rates from 18 to 55 percent by using data analytics. The *University of South Florida* has used predictive analytics to implement a Student Success Task Force and raised the six-year graduation rates from 48 to 68 percent. As of spring 2019, *Clemson University* has plans to "analyze student performance, class activities, instructor feedback and other variables to see if certain characteristics tend to define the best courses."

Further, statewide higher education agencies, like the *University System of Georgia*, are using predictive analytics to increase student support and success on a systemwide scale. Through its College 2025 Initiative, "USG is developing a new predictive analytics platform that will enable more institutions to widely employ data-driven advising techniques that act as early alert systems for students in their academic career."

Additionally, a white paper from the Desrochers and Staisloff of the RPK Group suggests that using predictive analytics in programs like the Integrated Planning and Advising for Student Success can generate a return on investment of up to \$1 million for universities. This information is promising in that many institutions can be hesitant to invest in programs using predictive analytics for fear that the cost may outweigh the benefit. Evidence of large ROIs may encourage universities to utilize predictive analytics.

### Institution Spotlight – Georgia State University

Georgia State University has become a national model for student success based on the institution's targeted approach to using predictive analytics. Since 2003 the university has been using massive amounts of data and predictive analytics to implement strategic programs designed to help students succeed and to close the achievement gap among students. According to a report by Complete College America, as of 2018, African-American, Hispanic, first-generation and Pell-eligible students have, on average, all graduated from Georgia State at or above the rates of the student body overall — making Georgia State the only national public university to attain this goal.

Over the past 15 years, Georgia State University has implemented at least 10 initiatives to increase student success based on information gleaned from predictive analytics. (See Table 2).

## Recommendations for States

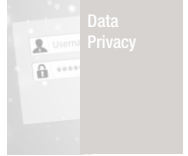
Both integrated statewide data systems and predictive analytics can be helpful tools for higher education institutions and agencies. Data systems allow institutions and agencies to review information on students from early childhood through postsecondary education. These longitudinal data systems also provide an efficient way for organizations to address trends and assess outcomes for students moving from postsecondary education into the workforce. State education systems should consider aligning data definitions and coordinating data collection efforts with other state agencies in order to get a clear picture of postsecondary students in their state.

**TABLE 2:** Current Georgia State University Student Success Programs

<i>Adaptive Learning Tools</i>	Delivers introductory courses in mathematics using a pedagogy that requires students to actively do math rather than merely hear an instructor talk about it. Leveraging adaptive technologies, students receive dozens of bits of immediate, personalized feedback every hour they are in class, and they spend class time with instructors and classmates in a math lab environment.
<i>Georgia State LIFT</i>	The Learning, Income and Family Transformation (LIFT) program was created to continue improving these outcomes by combining data-driven academic advisement with scholarships, employment opportunities, leadership training and more to help students from every background stay on track for graduation. LIFT forms an integrated suite of student success programs to take students from high school to college graduation.
<i>GPS Advising</i>	Uses predictive analytics and a system of more than 800 data-based alerts to track all undergraduates daily. Creates a structure of trained academic advisors to monitor the alerts and respond with timely, proactive advice to students at scale.
<i>Keep HOPE Alive</i>	Keep HOPE Alive provides a \$500 stipend for two semesters to students who have lost the HOPE Scholarship as an incentive for them to follow a rigorous academic restoration plan that includes meeting with advisors, attending workshops and participating in financial literacy training — all designed to help students improve their GPAs and regain the scholarship.
<i>Meta Majors</i>	Requires all students to choose a meta-major/career pathway, puts students on a path to degree that allows for flexibility in future specialization in a particular program of study, while also ensuring the applicability of early course credits to their final majors.
<i>Panther Retention Grants</i>	Using academic analytics, examines the drop lists for students who are on track for graduation and have unmet need and modest balances for tuition and fees. Students are offered micro-grants on the condition they agree to certain activities, including meeting with a financial counselor to map out plans to finance the remainder of their education.
<i>Reduction of Summer Melt</i>	A new portal to track students through the 14 steps they need to complete during the summer (e.g., completing their FAFSA, supplying proof of immunizations, taking placement exams) to be ready for the first day of college classes.
<i>Summer Success Academy</i>	Uses predictive analytics to identify admitted students for the fall freshman class who are academically at-risk and requires that these students attend a seven-week summer session before fall classes and pursue seven hours of college credit while immersed in learning communities, near-peer mentoring, and a suite of mindset-building activities.
<i>Student Financial Management Center</i>	Predicated on the premise that more students will persist if their financial problems are identified early and addressed, the center deploys predictive analytics parallel to those critical to Georgia State's ground-breaking GPS academic advising system. Through the SFMC, certified financial counselors track students daily and reach out to offer support and advice when problems are identified.
<i>College to Career</i>	College to Career is a campus-wide effort to get students to recognize the career competencies they are acquiring through their curricular and co-curricular activities; to document these competencies in a robust fashion through archiving textual, video and audio evidence in faculty and peer-reviewed e-portfolios; and to articulate the competencies through resumes, cover letters and oral discourse.

Sources: 2018 Report Georgia State University Complete College Georgia & GSU Student Success Programs website

Using predictive analytics and modeling to analyze the data in longitudinal datasets can provide a road-map to increase student outcomes in postsecondary education. Predictive analytics using data systems allows higher education institutions and agencies to address student needs through targeted advising, adaptive learning, enrollment management and many other student support programs. Institutions not currently using predictive analytics should consider this tool to increase student outcomes such as retention and graduation rates. Statewide agencies should also consider using predictive analytics in tandem with data from their longitudinal data systems to impact student outcomes on a large scale. Additionally, as there is more evidence of large financial returns on investments for universities incorporating predictive analytics, statewide agencies and universities should consider analytics as a way to promote longitudinal data systems use and sustainability.



## References

Association of Governing Boards of Universities and Colleges Innovation in Higher Education Case Study: Georgia State University. [https://agb.org/wp-content/uploads/2019/01/case\\_study\\_innovation\\_georgia.pdf](https://agb.org/wp-content/uploads/2019/01/case_study_innovation_georgia.pdf)

Bannan, K. (2019). [Universities Use Data Analytics Tools to Support Academic Advising](#), *EdTech Magazine*.

Complete College Georgia. 2018 Report Georgia State University <https://success.gsu.edu/download/2018-status-report-georgia-state-university-complete-college-georgia/?wpdmdl=6472128&refresh=5e173d6a9c8a31578581354>

Conaway, Keesler, and Schwartz (2015). What Research Do State Education Agencies Really Need? The Promise and Limitations of State Longitudinal Data Systems. *Educational Evaluation and Policy Analysis*. Vol. 37. <https://journals.sagepub.com/doi/pdf/10.3102/0162373715576073>

Denley, T. (2014). How Predictive Analytics and Choice Architecture Can Improve Student Success. *Research & Practice in Assessment*. <https://files.eric.ed.gov/fulltext/EJ1062705.pdf>

Delaney, M. (2019). [Universities Use AI to Boost Student Graduation Rates](#), *EdTech Magazine*.

Desrochers, D.M & Staisloff, R.L. (2019). Technology-enabled Advising and the Creation of Sustainable Innovation: Early Learnings from iPASS. RPK Group. [http://rpkgroup.com/wp-content/uploads/2015/12/rpkgroup\\_iPASS\\_whitepaper-Final.pdf](http://rpkgroup.com/wp-content/uploads/2015/12/rpkgroup_iPASS_whitepaper-Final.pdf)

Education Commission of the States (2019). Using State Data Systems to Create an Information Culture in Education. <https://www.ecs.org/wp-content/uploads/Using-State-Data-Systems-to-Create-an-Information-Culture-in-Education.pdf>

Education Commission of the States (2019). 50-State Comparison: Statewide Longitudinal Data Systems. <https://c0arw235.caspio.com/dp/b7f9300060022a2299054bc6b35a>

Hayhurst, C. (2019) [Data Dashboards and Insights Help Students Optimize Their Performance](#), *Ed Tech Magazine*.

SHEEO (2018). The State of the State Postsecondary Data Systems. <https://files.eric.ed.gov/fulltext/ED598660.pdf>

USG (2018). University System of Georgia Releases College 2025 Recommendations [https://www.usg.edu/news/release/university\\_system\\_of\\_georgia\\_releases\\_college\\_2025\\_recommendations](https://www.usg.edu/news/release/university_system_of_georgia_releases_college_2025_recommendations)

Zimmerman, E. (2019) [What Can Real-Time Data Analytics Do for Higher Education?](#) *EdTech Magazine*.

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