Issue Brief

Big Data and Analytics in K–12 Education: The Time is Right

Technology for integrating systems, data and analytical tools makes it easier to support data-driven improvements in teaching and learning.

The Current State of K-12 Data and Analytics

Data, data, data — for K-12 schools and districts, it seems to be everywhere today. The problem is, in many cases, that detailed data about student demographics and test results isn't easily accessible to the people who need it most — classroom teachers, principals and instructional support staff. And that data doesn't always present the insights that teachers and schools need in order to pinpoint teaching and learning problems and identify the best ways to solve them.

Although the idea and application of "big data" is still fairly new in K-12 education, 50 percent of administrators surveyed by the Center for Digital Education (CDE) already see improved student outcomes from its use.[1] When combined with predictive and prescriptive models, data and analytics tools give educators the insights to help students improve their assessment results, remain in school, stay on track to graduation and increase their learning achievement.

However, current learning data can't always deliver this value because of shortcomings in its timeliness, completeness and granularity. These shortcomings arise from differences in what data is captured and what data can be extracted from learning management systems (LMS), student information systems (SIS) and other sources. Additionally, current assessment and information systems offer only limited capabilities for data analysis.

Today, new analytics tools are available that transform "just a bunch of numbers" into actionable understanding about needed changes in instruction. These tools capture data from multiple sources to uncover previously unrealized associations. Offered by vendors of educational assessment and data management software, these tools analyze student test results and other data, then present that information in clear reports at the student, classroom, school and district levels.

The Future of K-12 Education Data and Analytics

Data and analytics tools are fundamental to predictive and prescriptive instruction models. Currently the subject of much discussion among educators, these models focus on capturing useful information for application in the classroom to predict progress and outcomes for individual students. The models also use data to identify individual learning needs for students and help teachers address them more quickly than is possible with current assessment methods.

Two examples show these predictive and prescriptive models at work. An early warning indicator system (EWIS) uses data about high school students to predict college readiness and prevent dropouts. At the elementary school level, the Florida Assessment for Instruction in Reading (FAIR) uses reading assessment scores to predict a student's potential for future academic success. Other models address teacher growth by combining class assessment results with survey data.

Predictive and prescriptive models today yield useful, if sometimes imperfect and incomplete information. As research continues, the models will improve and give educators better ways to collect data and apply analytics tools for identifying instructional improvements.

Creating a Data and Analytics Action Plan

For many districts, "analytics" is still a largely manual process of extracting reports individually from multiple systems, then patching together the report information into a format that will be useful in decision-making. The challenge now is to deliver the data and analytics tools so they can be used within the schools for decisions about curriculum, teaching methods and learning resources.

63%
of respondents in a recent CDE survey said that implementing data management and analytics solutions is a priority.

Many districts are just starting to put together the elements for managing big data, such as creating data warehouses. But given the importance of data for improving student and school performance, implementing data management and analytics solutions is a priority for 63 percent of respondents in the CDE survey.[2]

For a district, delivering access to data and analytics everywhere requires a solid action plan with several elements.

Evaluation and planning. Review current information systems and data sources, then develop a plan for system integration at the district level that will deliver better information at the school level.

Partnership. Select and begin work with partners for database development and system integration. Look to state education departments and analytics solution vendors for their product offerings and consulting services to support your work.

School-based data teams. Create data teams within schools to evaluate the data received, identify the needs indicated by that data, and make collective decisions about school-level actions and changes.

Teacher training and support. Provide training and support for teachers in using data to improve instruction for the class as a whole and for helping individual students. Principals may also need training on how to give meaningful, data-based feedback to teachers.

Moving Beyond Simple Data Collection to Analysis and Action

The time is right for K-12 schools and districts to move beyond a simple focus on generating statistics and reports that are viewed once, then put away and forgotten. By implementing analytics technology, training and monitoring teams, educators can put data to the positive, constructive use that will lead to better instructional performance and learning outcomes.

Moving from Data to Insights

Eastern Upper Peninsula Intermediate School District (ISD) is an educational support organization for 17 public schools and small districts that are located in rural and, in some cases, economically disadvantaged areas. For several years, the district has emphasized the use of analytics software and consistent data collection on student results for the required annual state assessment and interim assessments administered by each school.

With data about student performance that is collected frequently and available immediately, teachers have implemented classroom changes that contribute to improved test results. Previously ranked near the bottom for student performance, schools in the Eastern Upper Peninsula ISD now meet or exceed statewide average results for math and reading in grades 3 through 8.

"When schools really use the data to identify their weaknesses and then take action to improve instruction, they can turn around test results quickly," says Michelle Ribant, director of general education for Eastern Upper Peninsula ISD.[3] "For example, using data from our end-of-year assessments, principals and teachers can identify the remediation opportunities that need to be offered in summer school, and jumpstart programs and classroom learning that kicks off the new school year."

Within each school, teachers and the principal set annual goals for improvements in student performance. Using the collected assessment data, they can identify which students are having problems with learning achievement, create a strategy for helping them and then monitor student progress throughout the year. "This approach really pays off for students and teachers because the objective data starts relevant conversations about what the students need to learn and how the teachers can help," says Ribant.

Endnotes

1. Center for Digital Education survey, 2013
2. Ibid.
3. CDE interview with Michelle Ribant, July 23, 2013