

MAGNUM



Using powerful business intelligence tools, two districts are drilling down to the finer points of student data, where the most revealing insights lie.

by Linda L. Briggs

“When marketing and sales really work together, you get a very powerful system,”

Dave Chiszar explains, drawing a parallel between business and education. “In education, when curriculum and assessment work together, you leverage some really good things.”

At the Naperville Community Unit School District 203, outside Chicago, where Chiszar is the director of assessment and quality analysis, really good things are the norm. One of the five largest districts in Illinois, Naperville has 19,000 students, and more than 90 percent of them meet or exceed state educational standards, according to Chiszar.

How have they done it? Through what Nicole Engelbert, a senior analyst in the technology business unit at Datamonitor, a market research and analysis firm, calls perhaps the strongest implementation of business intelligence (BI) tools she knows of in K-12. Naperville employs a sophisticated data warehouse, mining, and statistical analysis software from SPSS to track how its students are performing on ongoing assessments. Through incremental benchmarking and yearly testing, Naperville’s principals and administrative team can see how students are progressing toward standards, or whether a particular student’s performance is falling off.

Engelbert says the district uses SPSS not simply to check on student performance in the previous month, but to ask sophisticated, forward-looking questions such as: *Given what we know about how we did last month, are we or aren’t we on track in terms of adequate yearly progress? How much improvement do we need to make this week in order to stay on track?*

That’s the appeal of business intelligence tools, which offer schools the ability to look beyond a routine statistic, such as what percentage of students have passed a given test. Through data analysis, schools can view specific scores for a select group of students, for example, and compare that data to other groups, classes, or teachers. That, Engelbert says, is the kind of information the No Child Left Behind Act is after, and the kind that “BI fundamentally offers—the ability to drill down into your reports.” ▶

Using Assessment to Build Curriculum

Even before NCLB came into being in 2002, mandating that school districts show adequate yearly progress (AYP), Naperville understood the need to gather student data for use in curricular development. Roughly seven years ago, the district began following a 10-point quality-improvement process for K-12 called Standard-Bearer, a set of standards developed by the Schlechty Center for Leadership in School Reform that provides school districts a framework by which to continuously measure and boost the quality of instruction and level of student engagement.

Naperville began applying aspects of the Standard-Bearer framework to the curriculum review process, while at the same time using a template called Understanding by Design, to help build its curriculum and units. UbD, the brainchild of

solution, Engelbert says. That's partly because a new ERP or student information system shows staff and teachers what's possible; users then start thinking in new ways about data. As users move from the transactional reports that ERP and student information systems produce, the next step is analytics: getting insights and information from the data the ERP solution has made available. Engelbert says, "That's when the conversations about BI start to emerge."

Naperville selected and installed SPSS a little more than a year ago, moving up from the company's desktop products already in use. Prior to that, Chiszar says, the district simply "outgrew" Microsoft Excel and started doing some more-sophisticated things in an SPSS desktop program for Windows that handled statistical analysis. Users would then shift the data back into Excel for storage. "But we were creating

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East Coast-based educators Grant Wiggins and Jay McTighe, is a structure for improving curriculum and instruction that asks questions such as: What aspect of this learning will still be relevant to the student in five years? How do you know students are learning what you expect them to? What will carry through to other layers of the curriculum and to the bigger picture? By posing those sorts of questions, combined with the quality-improvement process inherent to Standard-Bearer, Chiszar says the district began to change how it designed its assessments.

"You get into this whole idea of assessment," Chiszar says, "and how to write a good assessment—how to collect the data; how to understand if your authentic assessments are measuring things well; how to understand if [the curriculum] is working

for the individual students."

As the Standard-Bearer and Understanding by Design precepts were implemented, fine-tuned,

BYTESIZE
The Association for Supervision and Curriculum Development (www.ascd.org) publishes materials for Understanding by Design.

and then applied to developing assessments, a growing awareness of the need for good data developed. Looking back, Chiszar credits the 10 points in the Standard-Bearer template with changing thinking and procedures throughout Naperville. "That was the foundation piece," Chiszar says.

Though Naperville was ahead of the curve on data gathering, other districts, according to Datamonitor's Engelbert, have been driven by NCLB's requirement for detailed reporting to begin looking to data-analysis products and tools as a solution. "There's a clear alignment between what BI does and what NCLB wants districts to build their reports on," she says.

Typically, the adoption of BI follows about 18 to 24 months behind the introduction of an enterprise resource planning

spreadsheets that were 130 megabytes, using up literally every column and almost every row of data." It became clear that the district needed a data warehouse and better tools. Enter the SPSS system, which serves as both a data warehouse and a data analytics tool.

"The district has used data for a long time," Chiszar says, explaining the evolution of Naperville's use of data to shape its curriculum. "Curriculum and assessment are tied closely together here." As a curriculum is being developed, assessments are developed at the same time to help administrators learn how students are performing against the curriculum. "The district learned a long time ago that you have to measure it to understand it," he says.

To help teachers with assessments and curricula, Chiszar explains that he and his staff of two work to turn useful statistics into "easy-to-read graphs that help answer the questions that teachers want answered." The graphs inform teachers as to what their students know right now compared to what they don't know, and what teachers need to help them learn. The visuals also let teachers know which students are on pace, which are falling off, and which are racing ahead—and what exactly that pace should be.

In addition to the window it provides into student progress, the software can be used to drill deeper into data. For example, in analyzing the results of a test, the system can present colored buttons that indicate overall performance on each question, along with question difficulty and response rate. But by drilling down, a user can see not only which students answered a question correctly, but also which answered incorrectly—a sophisticated indicator of question validity. This enables a teacher to get a report on any individual student.

"You can spend hours on any one test, clicking down to each individual student and looking at who answered what," Chiszar says. The system can also generate statistics such as which ques-

tions were consistently answered wrong; that information can be used in redesigning the test.

Creating the reports teachers need and want is a collaborative process. Chiszar and his staff regularly meet with a 20-person assessment steering committee, using an iterative process in which Chiszar says the first thing he and his people need to know from the committee is the nature of the business problem it's trying to solve. Second, they need to know what format the committee wants to see the report in. They then create an initial report and tailor it as requested as things proceed.

The goal is not to provide personalized reports for individual teachers; rather it's to create a set of reports that will be useful to a wide number of teachers. "We don't want teachers creating reports," Chiszar says. "We want teachers to have a report that they can have a conversation about with other teachers and with administrators."

In making the necessary ties in the curriculum-building process, teachers and staff regularly ask a fundamental question: *How will we know when a student has mastered an assessment item?* "You have to answer that question while you build the curriculum," Chiszar says. "You have to be thinking of the assessments while you build the curriculum. When assessment feels separate from curriculum, you have a problem." That continuous cycle of measuring and making changes, then measuring again, is all part of the quality-improvement process Naperville has adhered to for years.

Ultimately, the goal is to have "this wonderful, rich, robust set" of different assessments—some mandated by the districts, others optional—to offer to teachers and staff when they need it. However, "that's not the reality now," Chiszar says. "We have good pieces of it, better in some places than in others. But that's the idea of what we want to provide to staff.

"Training helps teachers understand which assessments to use when. The curriculum doesn't change; how to get students there is up to the teachers."

According to Poway CTO Robert Gravina, TIM gives teachers a simple entry to data such as student achievement scores. TIM is particularly helpful because it delivers data that is relevant to a particular teacher's students. "What used to happen, and still does happen in most school districts," Gravina says, "is that districts print out data and give it to the teachers, [then] try to teach the teachers how to use that data to change how they teach."

Instead, the system in place at Poway provides information on a desktop to teachers, allowing them to manipulate the data themselves to find statistics specific to their classes. Gravina gives an example of the sort of digging that can be done: "A teacher can go in and say, 'I want to look at all the students in my class that are second-language learners, scored below the 50th percentile on the CST [California Standards Test], have a MAP [Measures of Academic Progress] score of less than 220, and receive reduced lunches....You can do that in any variation.'"

Poway's IT staff has set up TIM so that California education standards and assessment scores are built in to the system. As Gravina explains it, a Poway teacher can select specific assessment scores, which the system translates into standards the students need to learn. "The teacher," Gravina says, "can then say: 'Okay, two-thirds of my class don't know how to write a comparative essay. This is a 10th-grade standard, and my kids need to learn this standard before the end of the year.'" Teachers can even drill down into which particular students don't know a given standard, then tailor lessons accordingly for those kids.

That feedback loop isn't that different from how Poway teachers operated before the SAS system was in place, Gravina acknowledges, but the time it takes to evaluate problems and make changes to what's being taught is far shorter. Assessments and adjustments to address learning needs are done throughout the year, rather than after students have moved on.

Convincing teachers to use TIM has been relatively easy, Gravina says, because it presents a graphical interface that's simple to use and relies on mouse clicks. That ease of use is key to appealing to reluctant teachers. Getting busy educators to use a new technology can be a challenge—Gravina says Poway offered good, useful data as a reward: "The thing with teachers is, you really need to give them a hook. We gave them some information they really wanted, like student phone numbers [and] parent home-phone numbers."

That information had been difficult to obtain because it was in the district's student information system, which teachers couldn't fully access. "That was the hook," Gravina says. "Once we got them to go in, they really loved it." He cites a survey of TIM usage conducted last year as evidence of its acceptance: More than 50 percent of Poway teachers are using the program on a weekly basis.

TIM is tied into other software systems at Poway; eventually it will be connected to human resources and finance, along with some predictive analysis tools. That will allow district administrators to collect information, for example, on the

links

Cognos
www.cognos.com

Datamonitor
www.datamonitor.com

SAS
www.sas.com

Schlechty Center for Leadership
in School Reform
www.schlechtycenter.org

SPSS
www.spss.com

Understanding by Design
www.grantwiggins.org/ubd.html

Speeding Up the Feedback Loop

Poway Unified School District, with 33,000 students, serves a suburban, middle- to upper-middle-class community about 20 minutes north of San Diego. The district has been using SAS data warehousing and analytics software for a little more than four years, both as a data warehouse and through a custom application it calls TIM—total information management. TIM is a user-friendly, SAS-built front end to the district's data warehouse.

costs of two different reading systems, then to compare those costs to each system's impact on student achievement. "We can ask: Which system is giving us a bigger bang for the buck?" Gravina says. To do that now would require pulling information from several systems, somehow combining it in one place, then sorting and analyzing the gathered data to produce meaningful reports. With all the software linked, Gravina says, administrators will be able to easily compare data across

says. Engelbert also recommends keeping an eye on SPSS and SAS in the K-12 market.

Beyond infrastructure, schools also face challenges regarding security. Although analytics tools don't make data less secure, Engelbert points out, they do make it more visible and accessible, rather than hidden in a database somewhere. Understanding the process of controlling passwords, identity, and access management can be a challenge. "There isn't a



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systems, such as assessing whether teachers who have been with the district longer consistently have students who perform better. "We'll be able to do some comparative analysis and some data modeling."

The project has come at a cost—the district has a full-time technician assigned just to work on the economics of the SAS product. "There's a lot of work that needs to go into customizing the program," Gravina says. "Even though it's an out-of-the-box product, you buy the base [and] have to develop it so that it meets your unique needs."

Implementation Challenges

Despite their usefulness—and despite the urgency for reporting brought about by NCLB—school districts generally lag well behind private industry and higher education in adopting BI tools and technologies.

One challenge for data warehousing and BI vendors is that the needs of school districts tend to be very particular. Business-oriented tools designed for a profit-focused Fortune 500 company simply aren't a good fit for education, which has a different structure and intent. Understanding that, some vendors are targeting the education market specifically. Datamonitor's Engelbert singles out Cognos as one example of a company that has focused on education and reaped big returns as a result. "It's put some great resources [into] understanding the needs of education institutions," she

strategy in place for understanding what [positions] need to have access to what data and what part of the IT infrastructure," she says.

A third issue in implementing BI is data integrity and quality. Without good data in the first place, it's difficult or impossible to perform any sort of useful or reliable analytics. "I have no reason to believe that data quality is very high in education," Engelbert says. "Institutions should assume it's poor, then implement strategy tools to address that. If you don't, you're proceeding at your own risk."

Despite the challenges, BI is doable—and can yield great returns—but cautions are in order. BI is not a technology purchase, Engelbert warns: "It's a business process or a change management decision." That means involving not only the CTO and IT directors at the table, but also representatives from the academic, process, and service departments. And be sure to choose a vendor that is familiar with your existing infrastructure, including your ERP and student information system. The best choice is a BI provider with experience in education, Engelbert advises, so that reporting models will be specific to K-12 and the educational process.

That's very different from many other uses of BI tools—with good reason, Engelbert says. "We're not

making widgets. We're educating students." **THE**

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