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Data Systems That Enable School Leaders to Make a Difference

How Winston-Salem/Forsyth County Schools provides fast access to meaningful data to make a difference

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You're a high school principal, and in your care is a third-grader who got on the wrong after-school activity bus. Discovering the mistake, the driver dropped him at the next stop, according to school policy. Lost and scared, the boy can't remember his phone number. You can hardly make out his name, and even if you think you heard it, you can't begin to guess how it is spelled. What do you do?

You discover a gaffe. The public relations department has given a newspaper reporter some enrollment statistics from the school district's website, but student populations have grown and shifted quite a bit in the five months since those figures were posted. The newspaper published numbers that are now wrong. What do you do?

An administrator is standing in your doorway, asking for yet another ad hoc report that was needed yesterday but not requested until today. Can you deliver it today or tomorrow? You know it will take a week to find the data, validate and integrate it, and create the report. What do you do?

Data about students, staff and operations is scattered somewhere in 22 different "databases," some of them nothing more than Excel spreadsheets. Data is inconsistent across these resources, so reports to the school board, the state and grant organizations can be inconsistent as well. What do you do?

If you're the assistant superintendent for technology for your school district – perhaps the only person in the state who holds that role as a senior staff member – you make some big changes in how data is managed and used.

That's just what Betty Weycker and her colleagues did for Winston-Salem/Forsyth County Schools in central North Carolina. Starting with a hodgepodge of disparate data sources and ad hoc processes, the team created a unified information infrastructure that now delivers meaningful, interactive, visual reports to support data-driven decisions.

■ Winston-Salem/Forsyth County Schools leaders and administrators are transforming teaching and learning by using 21st century data systems to provide a holistic view of their district's data.

The Value of Data-Driven Decisions

Data processes may have been insufficient before, but the school district was doing well, Weycker recalled. Students were making sufficient gains in every subject area and grade level. Since there seemed to be no problem with overall performance, it might have been a hard sell to ask the school board to support an information overhaul. Not so, said Weycker: "I was lucky, because we had built our case so effectively that when we took it to the board and our superintendent, they didn't come back and say, 'No, pick just one component of this.' So we bought the whole enchilada."

The business case was clear. The limitations of the existing system were obvious. "Prior to using SAS®, school officials stored data in two-inch binders," Weycker recalled. "Principals frantically flipped through binders to make sense of the data for their schools. They literally had their hands on the data, but struggled to find the information they needed."

With better access to consistent data enabling more data-driven decisions, the school district could serve its constituents better in many ways. Solid, trustworthy data, available when and where it was needed, could help:

- Assess the effectiveness of learning processes at reporting and testing intervals.

- Detect problem areas and guide solutions and school improvement planning.

- Support progress monitoring and appropriate adjustments during the learning process.

- Improve quality and usability of data for all purposes, including mailings, required state reports and grant applications.

However, a redesign of the district's information systems had some inherent challenges:

It is a large school district, and growing. Winston-Salem/Forsyth County Schools is the fifth-largest system in the state and the 83rd-largest in the nation. The district comprises 42 elementary schools, 16 middle schools, 11 high schools and 11 nontraditional schools – for a total of 80 schools, approximately 52,000 students and 8,000 teachers and administrators. The system gains about 500 students a year, so new schools are regularly being opened.

The district serves a diverse student population. The No Child Left Behind Act requires measurements of proficiency scores for subgroups of students, broken down by race and other categories. If any subgroup does not reach the state proficiency goals, then the entire school does not make its adequate yearly progress (AYP) goal. In a district with significant ethnic and socio-economic diversity, it is critical to have more than percentages and summaries of student achievement in order to know which students and teachers might need extra help.

Distribution of students changes, sometimes markedly. Winston-Salem/Forsyth County Schools is one of the few districts in the state that still operates on a choice system. Parents can choose from their neighborhood schools, another school in their zones or from 15 magnet programs. "This choice creates a certain amount of havoc on student management," said Weycker. "There's always some movement, some decisions we have to make, so we've got to have accurate data. The 'Schools of Choice' process window opens Feb. 1, but sometimes those choice plans aren't finalized until the wee hours."

Various departments maintained their own data resources. "We had 22 databases spread across our data management team," said Weycker. There was the Student Information System, a human resources system, finance system, and separate systems for tracking exceptional children, K-2 assessments and EOG/EOC scores, just for starters. A simple request from a newspaper about student enrollment could entail requests to several people who each had different pieces of the answer in their spreadsheets or server files.

To be able to use data for decision making and improving school performance – not just issuing reports for reports' sake – a more holistic and real-time information architecture was needed.

Early Steps Toward Information Evolution

The school district took some intermediate steps along the way to improve information access and sharing.

Step 1. Corral the spreadsheet renegades and runaway reports.

Initially, the data management team created a SharePoint Web portal to provide an archive of reports for easier access and sharing. "As people started asking for reports, we started posting them," said Weycker. "Our thinking was, if you need this today, you might need it tomorrow, so if we post it on a portal, everybody will have it. We thought it was a good effort, but did they look? No, they didn't look." Furthermore, the SharePoint site became unwieldy as more and more specialty folders were added to the initial file folder structure.

Step 2. Bring multiple reports into one cohesive view.

Weycker showed an example of an early effort to delight administrators. "We brought them in and we said, 'We have pulled together all these reports for you. When you get your test scores, and you take your highlighters, and you highlight your Level 2s and your Level 3s – well, here we've done it for you.' They loved it, and they loved us – for a few days. The report looked good, but it was summary data percentages. No detail.

■ Summary reports showed what percentages of students from which subgroups were making adequate yearly progress, but administrators and PLC facilitators needed to know exactly which students needed extra help.

"We did the same thing with the AYP reporting. We were so proud of this. We took all of the requirements of AYP, all of the subgroups, and we gave them the percentages. But again, the question from the principal was, 'How do I know who these kids are?' That's the piece we weren't giving them very effectively. At the time, we were handing them a piece of paper, and basically all we did was save highlighter ink and paper. We had to go further."

Principals and school district leaders wanted to have up-to-date data, the ability to monitor it daily and to drill down into detail such as profiles for individual students – and they wanted it all at the push of a button.

Redefining the Information Environment with SAS®

"After researching data warehousing solutions, we determined that SAS could provide the tools and resources we needed," said Weycker. The school district's solution includes the following components:

- SAS® Enterprise Guide®, a point-and-click, menu- and wizard-driven tool for efficient, visual data analysis and reporting.

- SAS Enterprise Data Integration Server, a point-and-click desktop tool that makes it easy to build workflows for accessing and processing data from virtually any hardware platform or operating system.

- SAS Web Report Studio, a query and reporting application designed for general business users who want to view, create, share and explore reports in an easy-to-use Web browser environment.

- SAS Information Map Studio to create and manage information maps that show data sources, transformations and outputs in terms business users can understand.

Weycker described the various activities the team undertook in implementing its SAS solution, from assessing the patchwork of available data sources to defining the data processes and overlaying best practices and governance.

Find and evaluate the current data sources.

"Five years ago, our director of accountability, our superintendent, our director of curriculum instruction – several of us got around a table and said, 'All right, let's just see what we have and what we need,'" said Weycker. "We spent a year studying the different data sources that were out there. The result was scary. Our data was everywhere. It was fragmented and overlapping, and that was really concerning. We had to figure out a way to pull all of this together."

■ "We were amazed to find how many data sources were out there already. 'Database' must be one of the most misused terms in our district. Everybody thinks that because it's in an Excel spreadsheet, therefore it becomes a database."

Betty Weycker, Assistant Superintendent for Technology for Winston-Salem/Forsyth County Schools

Establish an authoritative source for data.

"When you start this kind of initiative, and you start pulling in all these sources, everybody thinks their data system is the authoritative source for data," said Weycker. "We've had some knock-down, drag-outs about this, but that [inconsistency among sources] is the reason we would have this person get a report, that person get a report, and the two reports wouldn't be the same because they used two different data sources, or they didn't know what they were looking for or asking for."

Determine what information is needed, in what form.

"As we were building out this process, we were continually going to the leadership team for their input. We asked administrators to identify the reports and data they needed," said Weycker. "Administrators determined the emphasis should be on clean data and drill-down capabilities – right down to individual student performance.

"We asked two elementary school, two middle school and two high school principals to identify and help develop the reporting tools they needed the most. We didn't assume we knew what they needed most – or needed first."

Cleanse and validate the data.

"Unfortunately, homegrown databases are often no better than the person growing the data," said Weycker. "In some cases that was excellent data, in other cases it was not usable. We had to eliminate some databases."

So, once the school district selected SAS to consolidate its data islands, the foremost question was how to cleanse the data. The existing databases contained duplicate records, inconsistent data entry conventions and missing elements.

"If Johnny went to School A for three days and then went over to another school, and the records didn't transfer efficiently, you would find overlaps of data," said Weycker. "When we were all on our individual databases, we were constantly looking at duplicate students, and that meant every school was. We couldn't have those types of things happening."

In addition to improving the quality of analysis and reports, data cleansing with SAS brought some ancillary benefits:

- By ensuring that address information in the database conformed to USPS requirements for mass mailings, the school district dramatically reduced the number of returned letters and saved $5,000 on one mass mailing alone.

- Matching siblings in the database reduced the mailing list to 41,000 households and helped with both the Free/Reduced Lunch Program application process and identifying siblings for the Parent Assistant program.

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■ "When we do a mass mailing for 41,000 recipients, that's a pretty significant budget item. Before, about 10 percent of our letters would be returned for address errors. After using SAS data cleansing tools to have the database conform with USPS rules, we got back only a handful of letters on our next mailing."

Betty Weycker, Assistant Superintendent for Technology for Winston-Salem/Forsyth County Schools

"After you look at some of this data, you find simple ways to achieve great gains," said Weycker. "SAS puts all our data in one location, one resource, so we can use these tools and focus more on data cleansing and getting the information in the hands of our constituents more effectively."

Create repeatable data integration routines.

With SAS tools, data integration jobs are defined in a Gantt-type graphical display. "Each box represents an individual job that is pulled together in one large job that runs this process," said Debbie Harman, NC WISE Coordinator for Winston-Salem/Forsyth County Schools. "Even though this is a graphical user interface, the tool is creating code in the background at the same time. So for those who have programming knowledge and actually want to hard-code something, the capability is there for that as well.

"It took some time to build these individual jobs, but the beauty of SAS is that I do not have to do this again next year. The power of the tool is that, once you have captured what needs to be reported on and you have made it happen in the tools, you can come back to it tomorrow, next month and next year, and it's there."

Automated data integration proved its value for streamlining repetitive data integration tasks (such as bringing in the nightly data set from the North Carolina Department of Public Instruction) and for large-scale jobs, Harman noted. "Once a year we have a *huge* data collection task for federal reporting for the Office of Civil Rights. We had two programmers who joined us in November; the data was due in December. Four years ago, I would have been stressed and really concerned about meeting that deadline, but with the intuitive nature of the SAS tool, we were able to meet that deadline. I'm really proud of the efforts the programmers did, but they had the tools to make it happen."

Publish the data in an easy-to-use, easy-to-understand format.

With logical, graphical interfaces, the SAS tools make it easy to surface the desired data, but Weycker wanted it even simpler for principals and school district leaders to use. "It doesn't matter how fast a data manager can flip through the screens; our principals and administrators shouldn't have to sit at a desk and remember, 'Now was that F7 or F8,' or 'Do I go to this menu?' We needed to put data in their hands in a way that makes it timely and available for them to use effectively." The goal was to offer visual, interactive, Web-based reporting with drill-down capabilities.

"With SAS Enterprise Guide, we can store report processes and put them out there for users, who can go to our portal and get the information they need with the click of a button," said Harman. "In this day and age, users shouldn't have to know where to go to find the data. We have to put it out there for them to use, and it should be as simple as clicking on that report each time they go to it, and for them to know that it is real time, it is what they need, and it is effortless on their part. We're very excited about the possibilities."

■ "Everyone wants their data yesterday. They probably should have thought about it earlier, but they needed it yesterday. With the tools that SAS is providing us for our data warehousing, we can provide that data on a fairly short turnaround for those who are trying to make grant applications or administrative-level decisions."

Debbie Harman, NC WISE Coordinator for Winston-Salem/ Forsyth County Schools

■ "This isn't just putting data in the hands of some people. It is putting information that could impact student achievement *inside* the school."

Betty Weycker, Assistant Superintendent for Technology for Winston-Salem/Forsyth County Schools

For now, the reports are available to administrators and PLC (professional learning communities) facilitators, but it could just as easily be opened up to anyone or everyone in the active directory staff listing. The only constraint is making the time to orient users to the system and instruct them in best practices for data use.

Establish best practices for data collection and requests.

"I can't tell you how many times I would get people standing in my door, wanting a report now – not understanding it could take two days or two weeks to build that out," said Weycker. "It didn't matter. Everybody wants data and they want it now.

"So we implemented a process where if you needed a report, then you have to put in a ticket, just like if your computer was broken. That was an earth-shattering culture change for users. From the superintendent level down to the newspaper reporter to the people in the grants organizations or out in the agencies, we require them to submit a ticket."

The ticket policy helps the staff track in-process and pending requests, identify duplicated efforts, and manage users' expectations. "It's easy to overlook something like this, but these are considerations that will make a real difference on how the processes work," said Weycker.

Insights on Demand, Just a Click or Two Away

The creation of a data warehouse provides a secure location to house a broad array of data – from student demographics to individual test scores to summaries for AYP reporting. The first reporting initiatives with this data warehouse focused on school improvement and rapid evaluation of projects and programs.

Interactive reports with drill-down capabilities

Weycker provided a live walk-through of a sample course enrollment report: "Choose a course, such as 'Algebra1,' from a pull-down menu to display a chart of course enrollment by teacher. You can then zoom in on one teacher and see that she has 55 students and she teaches Algebra 1. I know from our value-add reports that this teacher is not doing very well, so let's see how her students are doing.

"You can drill down to see which students are in her classes, then click on a student name (or enter a name) and now you've got the detail, a complete profile. Student achievement, test score data from grades three to 12, absences, discipline record – it's all right here [in the linked student achievement report]. By giving users this data, they don't have to go to a file cabinet, or to a teacher, or to a data manager to pull out these things."

Reports Generated with SAS®, 2010 - 2011

Course Enrollment

Student Achievement

Course Failure

AYP Summary

The same drill-down capabilities bring new value to the AYP report, which is now available for daily monitoring (or for a specific date or date range), not just for end-of-year reporting. "A bar chart shows your subgroups relative to the AYP threshold," says Weycker, "which is 40 students. Immediately an administrator can look at detail for their subgroups. If you want to look more closely at an underperforming subgroup, you can just click to drill down to that detail. Then you can go to that third-, fourth- or fifth-grade teacher and say, 'These students are part of this subgroup' – not that you don't focus on everyone else, I always try to qualify that – but at least you know who your students are, and that's important for us."

Districtwide student locator application

Remember that scared third-grader stranded after taking the wrong late bus? Before the new data warehouse, he might have been stranded for a while. Every school maintained its own roster of students. In a choice system, he could have come from any number of schools.

"We found elementary school kids were being dropped off at high schools, and we realized we've got to give administrators a way to quickly and easily look up a phone number," said Weycker. "What a simple concept – but with our previous data islands, how difficult that was.

"Now we have created a student locator, so any administrator across the system can pull up a list of all the kids, identify that student, drill down to see the student's name, who he is living with, emergency contact information, etc. Now they have phone numbers, and they have ways to get that child safely to where he needs to be. This is huge. This report is probably our most used report. It seems so simple, but it did require compiling so much data across our system, for 52,000 students."

■ "We need summary-level data – we need to know what percent of students are doing what, or that 93 percent of students are getting what they need – but we also need to know that Johnny is not being effective in Reading 3 in this quarter. That was a goal – to find a way to focus in on the detail."

Betty Weycker, Assistant Superintendent for Technology for Winston-Salem/Forsyth County Schools

■ "We are thrilled with what we have now – the tool that's in our hands that we can provide throughout our district, to anybody who needs data. We are excited about the possibilities, and we've got what we need to make that happen for them."

Debbie Harman, NC WISE Coordinator for Winston-Salem/Forsyth County Schools

Closing Thoughts

There's still more to be done, said Weycker, and more opportunities ahead. The data team is continuing to expand the repository of reports to support data-driven decision making, and using data integration tools to automate jobs for other recurring requests. "Administrators are using these reports, and they're hungry for more, so that's a good thing.

"We're not perfect, and we still live in our own islands to some degree. We meet once a week, but we don't share information as often as we should." For example, quarterly test data still resides in an internally maintained database, an island. It will be pulled in as well, so student achievement can be monitored on a quarterly basis.

"That's when we're going to be making a real difference," said Weycker. "Not looking back at what happened a year ago, and not looking back at trends from three years ago. That's all value-add, but for that classroom teacher or administrator, what is important is what is happening on a day-to-day basis."

If you look at the continuum of data needed to support the school district – from after-the-fact summaries to formative data to support future planning – you'll see key areas where the SAS solution is already providing the data. "AYP results, demographic disaggregated data – they don't need to be building that; SAS and our team are providing that for the schools." In another year, you'll see SAS filling in more areas of this continuum, Weycker said.

"Those are examples of what we're doing with data, not just so we can produce this report to say that we've got this report or so you can turn it in for this grant, but so we can make a difference in student achievement. Isn't that everyone's goal, to make a difference for each and every individual student?

"For our data warehousing tools, we are right where we need to be, and we feel like we are making a difference. We now feel like we are a critical piece of making all of our students and partners successful."

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