Reporting: What You Don’t Know Will Hurt You
Why higher education is modernizing with data visualization and analytics
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Why Higher Education Is Modernizing With Data Visualization and Analytics

Higher education institutions are learning to adapt quickly to both internal and external pressures – and to do this, they are modernizing how they deliver information to decision makers. Facing greater accountability and fiercer competition for students, decision makers increasingly understand that what they don’t know – about students, for example, and the future impacts of decisions – can hurt them and the institutions they work for. More than ever, decision makers increasingly need to be proactive and make informed plans based in current and future realities, not just the past. For this reason, they can no longer afford to rely solely on historical reporting to support decision making. They need to understand what's really happening today, as well as anticipate the future and respond proactively as trends and student populations change.

For higher education institutions, this will require using data more proactively and interacting with the real-time flow of information across the organization for faster decision making at all levels. Higher education institutions already collect vast amounts and types of data, but it's typically spread across different schools, departments and campuses in various formats and a multitude of systems. For most, it's a massive challenge to make all that data available, connected and usable to everyone who needs it. Traditionally, IT and IR (institutional research) departments assume responsibility for this effort, but their limited resources have already been stretched to support reporting requests. This work took time, rendering the information out of date and thus less useful.

To take data usage to the next level, higher education institutions need a decision support system – complete with data visualization and self-service analytics – that makes it easier to use enterprise data for faster, better decision making, anytime and anywhere. These powerful, easy-to-use solutions allow people to be proactive, look at more options, uncover hidden opportunities, identify key relationships and make precise decisions faster than ever before. And when they support self-service, easy, ad hoc visual data discovery and exploration, data visualization solutions place lightning-fast insights within everyone's reach.

This paper examines the barriers to adoption from an IT/IR and end-user perspective and shows how data visualization and analytics in general – and SAS® Visual Analytics in particular – can eliminate these barriers.

What’s Wrong With ‘Just Reporting’?

By and large, reporting tends to look backward, telling users what has happened based on historical data contained in data warehouses, which is then presented in predetermined reports. It provides no insights into the future.

Data visualization takes reporting to the next level. It lets users visually explore critical drivers for making better decisions in order to find out why something happened. Users can interactively examine all options and uncover opportunities hidden deep in their data.
Analytics takes things one step further by helping users understand what is statistically likely to happen in the future, while taking into account the fact that data changes daily. For example, analytics can be used to explore what-if scenarios, predict outcomes, and solve specific business problems in an interactive, iterative manner.

An IR and IT Perspective on Barriers to Data Visualization and Analytics

One would think that implementing a decision support system that gives users access to ever-changing data needed to make better, data-informed decisions would be a proverbial no-brainer. However, from the perspective of IR and IT departments, there are some perceived barriers that stem from existing, historical approaches to reporting. These include:

- **Complex analysis.** Users have a need to drill into data for more information. Drill-downs are typically set up using OLAP cubes. While valuable, these cubes can present problems to a busy IT or IR department. The cubes are often complex, which means that their creation can be time-consuming. Once created, there’s no guarantee that they’ll meet the needs of the intended user. This can happen because of miscommunications between IT/IR and the requesting department.

- **Multiple disparate data sources.** Typically, conventional approaches to creating reports involve multiple databases and require that the data goes through an ETL process. Manually converting that data for compatibility in real or near-real time can be impossible using conventional means and limited resources.

- **Performance.** Many institutions already produce standard reports that require hours of computer time to produce. Often, people incorrectly assume that analytics would be even more resource-intensive, locking up users’ computers for hours as they perform complex calculations.

- **Limited analytic talent.** The demand for analytical talent is projected to outpace supply by 60 percent in the next few years. Competing with the private sector, colleges and universities are challenged to hire and keep master’s- and PhD-level graduates who can support the extensive data management and statistical programming needed to meet reporting demands for all departments across an institution.

- **Mobile requirements.** To gain acceptance among today’s end users, software must include web and mobile capabilities. But these capabilities add yet another layer of difficulty when implementing BI and analytics. Furthermore, users expect more than simple access to data on the go; they also expect to interact with it.

The introduction of data visualization and analytics alleviates all these challenges for IR and IT. Administrators and staff are empowered to quickly interact with, and collaborate around, data to generate new insights, visually explore data and even drill down independently to find answers.
An End-User Perspective on Barriers to Data Visualization and Analytics

Department heads and other end users face their own challenges in taking advantage of advanced analytics. For example, many end users face:

- **Significant learning curves.** Most education administrative professionals have little or no experience with analytics. Many are daunted by the prospect of being expected to use analytics to facilitate fact-based decision making. In addition, users tend to be nervous when having to learn and adopt new software for their role.

- **Delays in results.** A fact-based approach to solving business problems is typically iterative. If every query or iteration takes hours, the process of arriving at a useful answer may seem too frustrating and fail to produce results in time. These experiences only expand the chasm between IT and end users.

Data visualization software and self-service analytics overcome these barriers. Administrators and staff are empowered to visually explore critical drivers for making better decisions in an easy-to-learn, point-and-click environment. They can discover why something happened – and what will likely happen in the future. They can examine all options and uncover opportunities hidden deep in the data. And they can automatically highlight key relationships, outliers, clusters and more, revealing vital insights that inspire the next best action.

Modernizing With Data Visualization and Analytics

Thanks to data visualization software and self-service analytics, the days of ask-and-wait-for reports or OLAP cubes for traditional reporting are becoming a thing of the past. These new technologies put the power of data and interactive reporting in the hands of those who need it – when they need it – to enable far more timely, data-informed decisions.

This is best achieved when these data visualization and analytics technologies empower users to explore and analyze data independently. This eliminates the frustrating back-and-forth dialog between the user and the IR/IT departments, which often lead to misunderstandings, increased costs and delays in getting needed information.
In addition, when moving to data visualization and analytics technologies, it’s important to make the software available to many users and empower them to quickly and easily explore data. For example, they should be able to slice and dice the data, choose to look at more options, uncover hidden opportunities, identify key relationships and make more precise decisions faster than ever before. Self-service analytics and ad hoc visual data discovery, exploration and visualization capabilities make this possible, putting lightning-fast insights within anyone’s reach so they can:

• Conduct what-if scenarios.
• Anticipate the full impact of various decisions.
• Make informed choices today that result in better outcomes tomorrow.
• Use interactive reports and dashboards to quickly view key performance metrics.
• Share results via the web and mobile devices, and use this information to quickly interact with colleagues and collaborate on insights.

Consider the value, for example, of administrators and staff being able to use the latest data to assess students’ progress during the semester and determine which students are likely to attrite. Using this valuable insight, advisers could intervene promptly with targeted outreaches to underperforming, at-risk students.

Data Visualization and Analytics in Action

One of the best ways higher education institutions can learn what’s possible with data visualization and analytics software – and how to realize the most value from it – is to learn from other institutions that have already achieved success. Consider the following examples set by SAS customers:

North Carolina State University is a leader in analytics use among higher learning institutions. The university had been using separate systems for student information, faculty information, finance, human resources, facilities, etc., so that users could only report on data from individual data silos. To improve its ability to manage data, NC State linked all data and put it in a usable format for self-service analysis and reporting – thus transforming decision making across the university.

Des Moines Community College uses SAS to drive a culture based on data-informed decision making. For example, self-service reporting and analytics are used across the college to efficiently and effectively attract, retain and graduate students. Self-service access enables users to securely view data and reports, giving them more time to mine data in greater detail to more proactively help students succeed. This culture even extends to tracking graduates to see how they are doing in the “real world” – for instance, whether they moved on to a four-year college, embarked on a career, and more.

The University of Texas System has implemented a self-service information portal to help make informed decisions and to gauge progress toward the goals of its strategic plan. An interactive data warehouse with a user-friendly dashboard serves several purposes and has improved transparency by providing open, public access to information. Now leadership can easily understand, evaluate and customize information and reports (with minimal IT reliance) to make data-driven policy decisions and assess progress.
UNC-Chapel Hill has developed and implemented a new and more robust data warehouse and sophisticated data visualization solution that will help modernize the way that the university utilizes reporting.

The University of Oregon developed a “Financial Aid Simulator” for administrators to redesign their merit aid program to recruit high achievers more effectively. They’ve uncovered deeper insights into the behavior of applicants who were accepted and offered merit aid, thus increasing the likelihood that these students will enroll. Administrators have also learned how much merit aid is needed in a financial aid package to make high-achieving, in-state students more likely to enroll.

Sinclair Community College uses SAS Visual Analytics to generate detailed, timely reports quickly. For example, daily enrollment management reports give deans and directors insight into how Sinclair’s enrollment compares to previous years. And a degree audit report allows Sinclair’s chairs and advisers to look at students’ degree progress. Because reports are self-service, the Office of Research, Analytics and Reporting can truly focus on things that matter, such as deeper analysis and looking for more ways to apply analytics.

Wayne State University pairs SAS Visual Analytics with Hadoop to make data-informed decisions. In just five months, the school transitioned 80 percent of the old, non-drillable reports into new interactive reports and dashboards. Now administrators have access to self-service analytics and student-level detailed information through these dashboards. It’s easy for them to drill down into detailed information on enrollments, demographics, classes, students and more.

Each of these institutions started with raw data and a vision. They’ve seen impressive success in using data visualization and analytics to drive change and transform their processes, operations and funding.

How SAS® Can Help Your Organization

Delivering on this new paradigm, SAS Visual Analytics addresses the education-specific issues of complexity and timeliness, effectively removing the barriers to self-service analytics that have previously prevented higher education from realizing the benefits of data-informed decisions. By choosing SAS Visual Analytics, you gain powerful capabilities such as:

- **Powerful analysis.** SAS Visual Analytics handles the once daunting issue of complexity for end users and IT alike in several ways. For end users, it provides an interface specifically designed for nonprogrammers. For example, users can easily create hierarchies (e.g., year/semester/month/day or school/department/class/student) by simply dragging and dropping variables they want to explore for trends and correlations. Users don’t need to create OLAP cubes to get the results they need, meaning no support from the IT department is required. Instead, powerful analysis, combined with visual data exploration, are processed on the fly with in-memory computing to a wide array of users – on any web interface.

- **Interactive discovery.** See the big picture and the underlying connections. It’s easy and fast to visually explore all relevant data. Interactive discovery lets you examine all the opportunities hiding in your data. Users can find out why something happened and identify the critical drivers needed to make better decisions. The software automatically highlights key relationships, outliers, clusters, trends and more, revealing critical insights that inspire action.
• **Approachable analytics.** Visual data discovery and self-service analytics put fast insights within the reach of users and analysts – even those who lack analytic skills – so that they can assess all possible outcomes and make better, data-informed decisions. No coding is required for even sophisticated analytics (e.g., decision trees, forecasting, goal seeking and scenario analysis, path analysis and text sentiment analysis). Analytical visualizations and smart capabilities reduce the need for manual experimentation and automate the identification of patterns, outliers and clusters hidden in data. You don’t have to worry about missing key insights, and you can work collaboratively with experts to focus on what's most relevant.

• **Information-sharing capabilities.** With SAS Visual Analytics, users can easily create interactive content to understand what’s happening and why. Content can be shared with others in the applications and interfaces they are most familiar with on a day-to-day basis - for example, via Microsoft Office applications and mobile devices. Administrators can quickly interact and collaborate with reports, dashboards and insights to better understand business performance, jointly interpret results and decide on the best actions. In addition, SAS Visual Analytics allows non-technical users to create and share content across the full spectrum - from self-service data preparation to interactive discovery, reporting and analytics - in a trusted, governed manner.

• **Mobile-friendly access.** Obviously, the results of analysis need to be displayed to meet users’ needs if they are to have value. This need complicates the challenge of enabling mobile devices, which come in a variety of shapes and sizes – not a trivial problem when visual displays are involved. Fortunately, in addition to providing web access, SAS Visual Analytics includes built-in native iOS and Android functionality so IT departments don’t have to devote extra time and energy to mobility issues. As a result, analytics and fast decision making are put into the hands of anyone who has secure access – at any time.

• **Flexible deployments.** You can deploy SAS Visual Analytics wherever it makes the most sense for your organization – on-site or in the cloud (either private or public). For on-site deployments, SAS Visual Analytics is available in a single-machine server or distributed server option, depending on your workload and scalability requirements. With all these options, your organization has the flexibility to match its product footprint to your business, budget and timing needs – and easily scale it over time as needs change and grow.

SAS Data Visualization brings powerful analytics directly to end users – with absolutely no coding required. As shown in the top-left corner of Figure 1, people can use SAS Visual Analytics to generate a line graph forecast that projects out the level of operating funds. The top-right visual is a correlation analysis showing the statistical relationship between multiple student pre-matriculation data points (ACT/SAT test scores and high school GPA) as well as their first year’s university GPA. The Sankey diagram on the bottom of shows students who began their college career as accounting majors and how they changed majors over time.
Figure 1: SAS Visual Analytics helps users across departments understand their data faster and use it to make decisions faster and easier.

Case in Point: Western Kentucky University

To better understand the power of SAS Visual Analytics, consider the results at Western Kentucky University (WKU). Here, the role of managing the massive amounts of student data belongs to Tuesdi Helbig, Director of Institutional Research. Her team establishes the foundation for data management, analytics and reporting at WKU. Together, they collect and analyze data, and then provide information to staff members about the school’s students, faculty, programs and courses to support decisions – from broad, strategic initiatives to more tactical issues.

WKU uses SAS to give decision makers better access to data – and more importantly, deep insight into how the university is doing. For example, the WKU executive team needs high-level, high-impact reports that tell a full story about student enrollment, revenue and strategic planning data. Deans and department heads get detailed reports on the students within their colleges and departments. And advisers can see which students are at risk of failing or dropping out, using risk models of student data to anticipate when someone needs additional help.

“People used to ask simple questions, such as how many students of a certain type are enrolled,” Helbig says. “But now they can get the simple questions answered, so they’re asking us more sophisticated questions like, ‘Are we driving majors off by requiring certain courses early in their major?’ or ‘Are there certain courses in our major that correlate with students changing their major or leaving the university?’

“Using SAS Visual Analytics reveals patterns that you wouldn’t see if you were using business intelligence tools. SAS makes it faster and easier to dig into tons of data and get meaningful results. Without SAS Visual Analytics, you are really making decisions blindly. This solution helps you see what’s in your data and what’s happening within your institution. And at any time, users can delve deeper into the visualizations – and the data behind them – to know more.”

“SAS makes it faster and easier to dig into tons of data and get meaningful results.”
– Tuesdi Helbig, PhD, Director of Institutional Research, Western Kentucky University
“Not only do WKU’s executives and deans get answers to their questions, but they are also finding answers to questions they didn’t even know existed. They’re asking more complex questions, which gives us the ability to provide better services to our students. Ultimately, that’s what we’re here for: to help ensure the success of each and every student.”

Learn More

SAS solutions enable efficient, effective use of data, IR and IT resources – and support informed, organizationwide decision making – by providing fast processing speeds, data exploration and visualization capabilities, and advanced analytics. Our higher education solutions offer industry-specific capabilities for:

- **University business.** Analyze information on student enrollment, faculty, courses, finance, hiring/salary, facilities, etc., for budget alignment, accreditation or resource forecasting.
- **Strategic plan development and monitoring.** Slice and dice data to predict the outcomes of different scenarios in your strategic planning.
- **Institutional research.** Speed and improve processes and give institutional decision makers the insights they need to make proactive decisions. Use prebuilt reports to quickly and easily generate the ones most frequently needed.
- **Enrollment management.** Access information from across multiple sources, share information easily across institutional boundaries, and uncover patterns and trends to attract the right students, maximize retention and sustain strong relationships throughout the student life cycle.
- **Institutional advancement.** Easily access and consolidate historical data on donors, alumni and prospects. Create predictive models that determine the likelihood of donor giving, and cost-effectively target those prospects with the highest propensity to give.

About SAS in Education

With a special focus on education, SAS strives to give everyone THE POWER TO KNOW®. SAS software is widely used to run the business of education. In fact, it’s the same world-class analytics software used by more than 83,000 business, government and university sites around the world, including 94 of the top 100 companies on the 2016 Fortune Global 500® and more than 3,000 educational institutions. And because of our commitment to education, SAS provides K-12 and degree-granting educational institutions access to SAS software at a significantly discounted rate. SAS also provides free curriculum and mobile apps for K-12, as well as free and low-cost student access to world-class software. Additionally, SAS collaborates with colleges and universities around the world to launch degree and certification programs to foster the current and next generation of analytics talent. With more than four decades of working in education, SAS brings together individuals, institutions, communities and data to derive insights in order to prepare students for college, careers and a brighter future.

For more information on how SAS helps higher education succeed, visit sas.com/education.

And to see a demo of a SAS Visual Analytics interactive report for higher education, or to get full access to SAS Visual Analytics, visit sas.com/visualizedata.