



Ten Tips for Using Data Visualization and Analytics Effectively in Education

A compilation of best practices from education institutions using SAS® solutions

By Georgia Mariani, SAS Global Industry Marketing Manager for Education

Forward-looking education leaders are adopting data visualization and analytics.

What's driving this upward trend? And what does it mean for your organization?

Innovators in education have one thing in common: They understand that when people have timely access to the right data and reports, they can generate trusted knowledge and insights that help transform programs, curriculums, student outcomes and more – and in ways that deliver desired results faster.

For example, they can empower decision makers to conduct what-if scenarios that help them anticipate the full impact of the decisions that they make today. Consider, for example, the ability to assess students' progress during the semester, which then allows advisers to intervene promptly with outreach to students who are underperforming. Using data mining, statistical analysis, forecasting, text analytics, and optimization and simulation, there are no limits on the insights users can gain. And when they give end users access to interactive, self-service analytic visualizations and ad hoc visual data discovery and exploration, they put fast insights within everyone's reach – even those who lack analytic skills.

But to realize these kinds of benefits from data visualization and analytics in education, they need software that supports three essential activities:

- **Data management:** The first step in any analytics initiative is to access, integrate, cleanse, validate and manage data as a valued asset so it can be used to drive strategic decision making. With a comprehensive management solution that supports analytics and decision management, organizations can fully exploit and govern information assets, uncover hidden insights that improve student success and enhance operational effectiveness.
- **Data visualization:** Intuitive, interactive dashboards empower users to visually interact with data; answer questions quickly; make more accurate, data-informed decisions; and share their findings with others.
- **Advanced analytics:** As use of reporting and analytics increases, users tend to ask more sophisticated questions. And this usually means doing more than just reacting to data in hindsight; it requires using analytics to empower leaders to become predictive, proactive, data-informed decision makers. For example, users can predict which students are at risk of failing or dropping out of school so they can proactively take steps to retain them.

Implementing transformative software solutions in ways that are widely adopted and deliver expected benefits can be challenging. In our work with SAS P-12 and higher education customers, we've captured key lessons and best practices from sources such as the following:

- [Valencia College uses data-driven approach to improve outcomes in higher education](#)
- [Wayne State University pairs data visualization and Hadoop to make data-informed decisions](#)
- [Des Moines Area Community College uses analytics and data visualization to help students prosper in the classroom and beyond](#)
- [University of Oregon uses analytics to determine which merit packages attract the best students](#)
- [Western Kentucky University on how they determine what's best for more than 20,000 students](#)
- [University of Oklahoma sees 90 percent accuracy with data-informed recruiting](#)
- [New education policy = new opportunities for reporting and analytics series](#)
- [Education meets big data: Statewide longitudinal data systems](#)
- [Improving student outcomes through high-quality early care and education programs](#)
- [Improve student outcomes and understand school performance through data and analytics](#)

In this e-book, we've brought together the top ten suggestions shared by our customers. Each illustrates how our education customers are realizing significant value from SAS solutions. They speak with the voice of experience - and offer time-tested insights that can help streamline and accelerate your evolution and maximize return on investment now and in the future.

SAS provides P-12 and degree-granting educational institutions access to SAS software at a significantly discounted rate. Learn more about **SAS[®] Enterprise Analytics for Education.**

Tip 1

Secure strong executive sponsorship

To have a successful reporting and analytics initiative, you need more than just budget to purchase software. You also need to have executive sponsorship at the highest level - someone who fully understands the value the initiative can bring to the district or institution and has a vision for using it to improve school, program and student outcomes. This sponsor can play a vital role by:

- Creating a vision around a student-centered, data-informed culture with increased accountability.
- Helping to eliminate “data jails” within departments by sharing a vision, addressing concerns about losing control of protected data, getting buy-in from colleagues to share data and navigating political issues that can quickly derail a project.
- Determining what information will be “kept in front of the curtain” (i.e., made public) and what data must be protected and secured.

Effective executive sponsors will also provide what they call “felt leadership,” meaning they are fully engaged and accessible. This builds momentum for the growing use of reporting and analytics by staff members at all levels. Felt leadership includes:

- Regularly attending key meetings about data requirements and desired metrics to learn how a district, college or department plans to use reporting and analytics.
- Communicating the vision and value of reporting and analytics broadly, regularly and positively.
- Leading by example and encouraging the use of reporting and analytics.

“Secure executive leadership for data and analytical initiatives from the president and vice presidents all the way down to midlevel managers. They talk to employees about the need for using data for decision making, as well as model using it in meetings and other contexts. Executive leadership from the top down is vital as non-data people are often intimidated by working with data and analytical reports themselves, which can hinder adoption.”

Karl Konsdorf, Director of Research,
Analytics and Reporting,
Sinclair Community College

Tip 2

Identify and involve stakeholders early and assess their unique needs

In both K-12 and higher education, you'll have a wide variety of potential users, such as administrators, staff, faculty, board of regents, government agencies, media, parents, the general public, etc. These stakeholders can have vastly different skill sets and requirements. So it's vital that you identify and engage these stakeholders early in the reporting and analytics planning process to get an understanding of their unique needs.

In these discussions, you need to know what kind of reports these users will need for their role, the detail level they prefer, any specific requirements, and more. You will also need to know the metrics and data needed for those reports so that information can be located and accessed. Usually this information will need to be accessed from multiple disparate databases and integrated into an enterprise data warehouse that will house all the required information for your reporting and analytics initiative. Armed with these detailed insights into the stakeholders you are supporting, you can develop a very targeted and valuable reporting and analytics solution.



"We want to make sure we build trust and that constituents know the data we are providing is good data. It's going to be something we've put a lot of thought and effort into."

Gina Huff, Senior Applications Programmer Analyst,
Western Kentucky University

Tip 3

Identify and integrate authoritative, trusted data sources

Once you know what metrics and reports your stakeholders need, assess the data sources available to help you meet these needs. Most likely, data will be scattered across fragmented systems in different schools, departments and campuses in various formats and a multitude of systems, which can create overlap, gaps and inconsistencies. For example, if a student went to School A for three days and then went over to School B, and the records didn't transfer efficiently, there would be double-counting of the student and report inaccuracies.

You need to carefully determine the best sources to integrate within your data warehouse. Expect some heated debates, as data owners will have reasons why their data should be declared the official data.

To ensure that data is interpreted the same way by all stakeholders, develop data definitions as part of a data dictionary. And to ensure data consistency and quality over time, establish a governance process for data validation and cleansing before it's loaded into the data warehouse. Data governance encompasses the people, processes and technology required to create a consistent enterprise view of an organization's data. It formalizes the process of managing information across an organization through business processes and policies designed to ensure that data is handled in a prescribed fashion, with human intervention handled by trained data stewards. By concentrating on the health of the data, you can create better data to support core strategies and initiatives.



"Make sure that the data is of high quality, so people will have to believe in it, have to trust it, and also make sure that they understand it."

Karl Konsdorf, Director of Research,
Analytics and Reporting,
Sinclair Community College

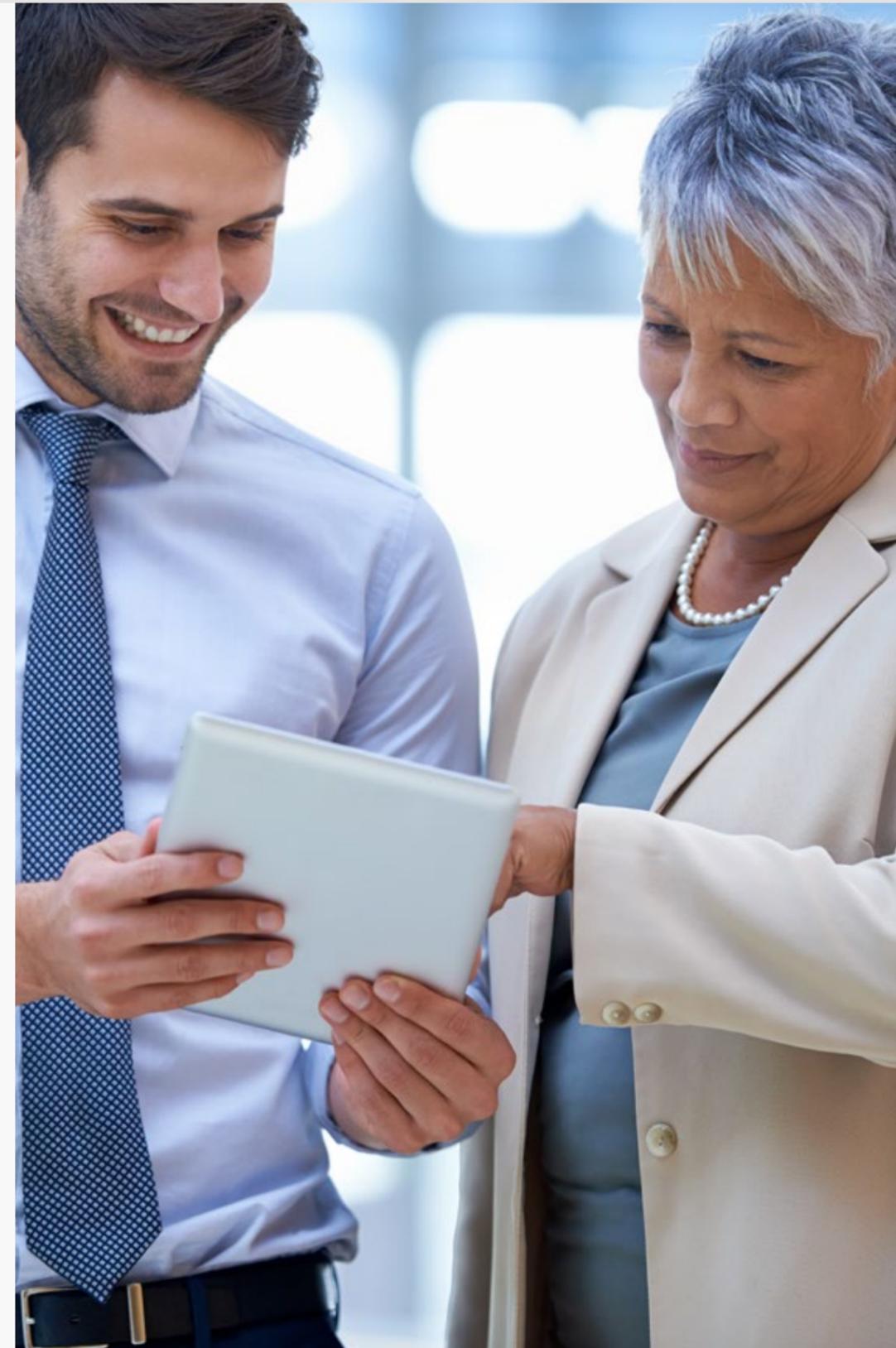
Tip 4

Manage expectations proactively

It's not uncommon for stakeholders to view reporting and education analytics software as some kind of all-powerful magic; they can ask for anything and instantly get whatever they want, however they want it. Effective reporting and analytics require that you invest in significant data preparation, integration and planning before anyone can have useful reporting.

So when engaging with stakeholders - especially upper-level managers - listen actively to their wish lists, help them prioritize what's most important to them and say "no" when you have to. Focus on what's achievable now - and save the rest for mid- and long-range plans. By being open and honest about what you can deliver (and when), you can help people have realistic expectations (the key to having happy customers) and build their trust.

Setting clear expectations is particularly important when working with upper-level managers, such as the board of regents (higher education) and superintendents (K-12), as they will expect certain things to be shown in reports from day one. The message to convey to them is, "We hear you. We will be able to deliver core analytics first - not the kitchen sink. If we can give you everything you want from day one, we will. If we can't, we will focus on the most important metrics first and we'll add on more later."



Tip 5

Determine the best way to process and deliver each report

It's all too easy to start manually building reports and dumping them out there. For some people, the tendency is to create comprehensive, kitchen-sink solutions that are overwhelming to read and use. For others, the tendency is to create hundreds of reports, many of which aren't designed to serve a specific stakeholder purpose.

To address these issues, find out what people truly need by performing a detailed needs analysis, and then scope reports based on your findings. Start by asking your users what kinds of questions they want to answer with the reports. Then create reports that help provide those answers. This approach will make your reports more usable, and perhaps uncover new and deeper questions that must be answered.

As part of this process, explore the following:

- **User types and expectations.** For example, the president of a university or the superintendent of a K-12 district might need a high-level, interactive dashboard of KPIs with drill-down functionality. Professors and teachers might need to see select information relevant to their classes and individual students via simple, online reports.

- **Formatting and reporting priorities.** When designing reports, present data using an easy-to-use, easy-to-understand, interactive format. As a general rule, include the 10 most important items for the target audience first and subsequent data in categorized layers within the report.
- **Access control requirements.** Stakeholders should only be able to see what is relevant to them. So be sure to use software that supports granular, highly secure access controls.

The key to success is implementing a flexible reporting tool that can meet a wide range of user needs and expectations. Increasingly, this means going beyond the scope of typical static business intelligence platforms and moving to intelligent business intelligence (or BI). SAS Visual Analytics, for example, provides an interactive user experience that combines advanced data visualization, an easy-to-use interface and powerful in-memory technology. It also allows a wide variety of users to visually explore data, execute analytics and understand what data means. Then they can create and deliver reports wherever needed via the web, mobile devices or Microsoft Office applications.



“Different audiences need different types of reports and analytics across the institution. For example, our executive team is interested in revenue, enrollments and strategic planning data for the university as a whole. They need high-level, high-impact reports that tell a story. The deans and department heads are interested in the students in their college and department and what’s going on with them. So they need a mix of high-level, high-impact and detailed reports on students. And advisors are interested in who is at risk. They need detailed contact information and risk models of student data so they can intervene when necessary.”

Tuesdi Helbig, Director of Institutional Research, Western Kentucky University

Tip 6

Provide training and self-help materials

Many education professionals are not savvy about data or analytics. They need help learning how to understand data and interpret analytical reports correctly before they can make informed decisions. So invest in user training and self-help resources, which can take many forms, such as video tutorials. Some institutions use a train-the-trainer approach, identifying key stakeholders whom they can educate and turn into effective, confident data consumers. Others provide hands-on user workshops in computer labs. Many utilize training provided by software vendors.

For instance, SAS provides [free training](#) “how to” videos, tutorials and demos to learn tips and tricks for working with SAS software. Regardless of the type of training used, complement it with additional self-help materials, such as user manuals and data dictionaries that define value hierarchies, data elements and more. These materials can be offered in hard copy or through context-sensitive online documentation.



Tip 7

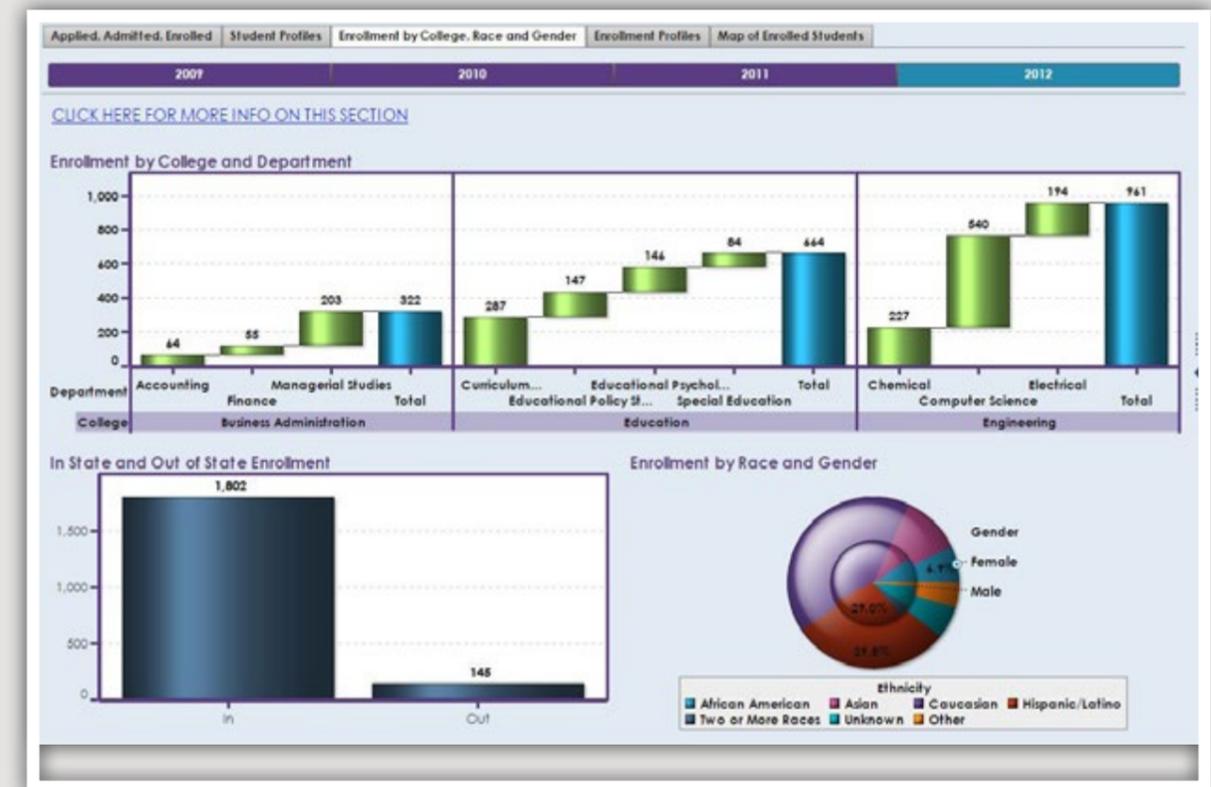
Provide easy-to-use data visualization tools

Data visualization tools close the gap between your stored data and the people who need it to make fast, data-informed decisions. They address the complexities of working with massive data sets - and make it easy to move from data to instant insight in two ways.

First, visualization tools eliminate the need for the back-and-forth conversation between users and IT (which often leads to misunderstandings and costly overhead) and wasted hours waiting for each iteration of analysis and reporting. To be effective, people need answers fast enough to efficiently explore a problem and go through iterations quickly and easily. And second, data visualization tools allow users to explore all relevant data quickly and easily. For example, they can slice and dice data, look at more options, uncover hidden opportunities, identify key relationships and make more precise decisions faster than ever before. And they can perform interactive, ad hoc visual data discovery, exploration and visualization for lightning-fast insights.

SAS Visual Analytics, for example, handles these issues for both end users and IT. For end users, it provides an interface specifically designed for nonprogrammers. They can easily create hierarchies on the fly (e.g., year, semester, month, day, department and faculty) and simply drag and drop the variables they want to explore to uncover trends and correlations. SAS Visual Analytics provides powerful predictive analytic and visual data exploration functionality to users on any web interface so anyone can easily process data using in-memory computing. Users can quickly design reports that are attractive, interactive and meaningful, then easily distribute them via the web, Microsoft applications or mobile devices. You can even create reports that enable recipients to slice and dice the information however they need to, using filters and drill-through capabilities to further explore data on their own.





“The data has to be presented in an easily consumable format. Don’t create just charts and graphs or tables of numbers, create something that’s meaningful, that’s targeted, and that users can connect with. Make sure that the visualizations are connectable as well as actionable so users know what to do with it.”

Karl Konsdorf, Director of Research, Analytics and Reporting, Sinclair Community College

Tip 8

Collect user feedback continuously and act on it

Immediately after the launch of dashboard, start gathering feedback from users about how they are using the system and ways to improve it. For example, you'll want to find out if you are delivering what people want, how reports and interfaces could be improved, and what's not proven useful to them.

Constructive feedback can help you refine offerings and services, as well as validate what's working and for whom. Many SAS customers, for example, have learned that their end users love how SAS Visual Analytics enables them to quickly and easily visualize data however they want to, and in a easily consumable and meaningful way. Top executives have reported how they love the ability to view dashboards on their mobile device -- and even when they are sitting in a conference or a Board of Regents meeting and need to answer complex questions, prove points and negotiate more effectively. These kinds of insights help you understand what works, what doesn't, and what kinds of features to look for in new analytic and reporting solutions.

You can collect user feedback through many channels. Some SAS education customers organize regular sessions with all types of stakeholders, where they record all the comments and suggestions, prioritize recommendations and implement them where possible. It's also beneficial to meet with stakeholders regularly to discuss data and reports in detail. For example, you may find that the reports you are providing are too high-level; users need to be able to drill down into detail, such as profiles for individual students. You will find it helpful to create a template of reports so users can validate that any changes meet their expectations. Also, many customers track report usage. This lets them quickly determine the key users and the top reports accessed in the dashboard. All of these mechanisms allow you to capture valuable feedback and act on it, which creates happy users.



"By using SAS Visual Analytics, administrators can view the information themselves anytime, anywhere, giving what one campus president described as the ability to see what is going on from my mobile device while I'm sitting in the drive-thru at McDonald's."

Daryl Davis, Director of Institutional Research,
Valencia College

Tip 9

Develop in-house expertise

SAS reporting and analytics software is incredibly diverse and powerful. So to quickly realize its full value, develop in-house expertise through two channels. During development, use SAS Consulting® for expert, on-site assistance and knowledge transfer. Then take the next step by taking advantage of SAS' online courses, training classes, software manuals and programming guides. SAS has [resources](#) for everyone, from beginner to advanced software users.

Universities and colleges typically have an office of institutional research that executes and manages all data management, reporting and analytics activities. But this isn't always the case for K-12 districts. Yet it's vital for school districts to have at least one person who is dedicated to becoming an expert in SAS software, developing and executing strategy, creating reports, educating people, answering user questions and more. Without sufficient focus and commitment, reporting and analytics initiatives will likely fail over time.



Tip 10

Publicize your solution and solicit feedback for continuous improvement

To build your user community, discuss education dashboards and how they can use them to gain valuable insights and answer complex questions that they could not before. Share success stories about how their colleagues in other departments, schools or classrooms have used reporting and analytics to improve performance and student outcomes. The goal is to educate and generate excitement about what's possible so that their entire district or institution can become more data-informed.

As more people learn about the reporting, analytics and visualization capabilities of your institution, you'll see increased demand. Helbig, says that as users become experienced data consumers, their questions become more sophisticated. To find the answers, you'll need to offer more data, more detailed reports and sophisticated analysis (such as advanced analytics), and enhanced visualization capabilities. Helbig uses SAS Visual Analytics for this. She explained in a recent [webcast](#):

"People used to ask simple questions, such as how many students of a certain type are enrolled. 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."

Because user needs will evolve over time - and numbers of users will likely increase - plan ahead when building out your reporting and analytics solution. Make sure you invest in software that can be upgraded, expanded and can scale as user needs evolve. And consider investing in a server (or servers) that can support a larger user group than your initial deployment.

Best Practices in Action

As you envision your next reporting and analytics solution, what do you see?

One way of envisioning how your education dashboard will change over time is to look at the publically available sites of institutions at varying levels of maturity. The following links take you to eight publically available education dashboards so you can experience first-hand the power of SAS solutions at work. You'll leave with inspiration and ideas to address your own reporting needs.

- [University of Texas - SeekUT](#)
- [University of New Hampshire Institute for Health Policy](#)
- [NC School Report Card \(click on 2014-2015 School Report Cards\)](#)
- [University of North Carolina](#)
- [University of Louisiana System](#)
- [North Carolina Community College System](#)
- [UNC Educator Quality Dashboard](#)
- [University of Texas System Dashboard \(choose the reports with !\[\]\(b348fb6989ecb279202d1458f9cb758a_img.jpg\) icon.\)](#)

About SAS for 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 80,000 business, government and university sites around the world, including 91 of the top 100 companies on the 2015 Fortune Global 500® and more than 3,000 educational institutions. And because of our commitment to education, SAS provides P-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 certificate 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.



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