

Analytics Across the Student Life Cycle

Empowering Higher Education With Analytics to Increase Student Success



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Empowering Higher Education With Analytics to Increase Student Success

Higher education institutions must balance a complex set of priorities and challenges. But regardless of the type, size or focus of your organization, central to your success is the ability to:

- Attract the right students.
- Optimize resource utilization and planning to meet student needs and organizational objectives.
- Drive student retention and graduation rates.
- Maintain strong relationships with students and alumni.

Achieving these goals requires informed decision making, effective resource planning and a commitment to optimizing student success across a wide range of departments. For example, administrative activities in areas such as marketing, course development and scheduling, academic policy development and enforcement, and at-risk student support services all play a critical role in determining:

- If a school recruits the right students.
- How effectively they are matriculated.
- When students graduate.
- How many students end up leaving before graduating.

Similarly, strategic planning activities need to drive decisions about what new academic programs to invest in; if and when to build new facilities; how to attract and retain the right students; and the optimal cost of the annual tuition, one-off classes and books so that students can afford to complete their degrees.

When these types of activities and processes are well integrated - and the right data and insights are made available to the right decision maker at the right time - your higher education institution can:

- Establish clear goals and planning efforts for the optimal enrollment (number and types of students) needed to fulfill the institutional mission.
- Promote students' academic success by improving access, transition, persistence and graduation.
- Encourage institutional success by enabling effective strategic and financial planning.
- Create a data-rich culture to inform decisions and evaluate strategies.
- Improve process, organizational and financial efficiency and outcomes.
- Strengthen communications and collaboration among departments across the campus to support enrollment and retention strategies.

Advanced Analytics: A Powerful Tool for Decision Makers

One of the keys to realizing these outcomes is applying advanced analytics across the entire student life cycle. Advanced analytics involves the use of data, statistical algorithms and machine-learning techniques to identify the likelihood of future outcomes based on historical data. The goal is to go beyond descriptive statistics and reporting on what has happened **in the past** to providing a best assessment on what will happen **in the future**. When you apply advanced analytics to this data across the student life cycle, you can:

- Generate deeper insight into students, the quality of student experiences and the external variables influencing their acceptance, retention and graduation rates.
- Uncover patterns and trends to make informed, proactive decisions that improve asset utilization, student experiences and outcomes.
- Easily share information across institutional boundaries.

These insights enable institutions to take a proactive, strategic approach to operational planning, resource utilization and decision making so they can attract the right students, maximize retention and graduation rates, and sustain strong relationships through graduation and beyond.

Of course, realizing the value of any analytical software always starts with access to accurate, complete data. All data relevant to the student life cycle - across all departments - must be consolidated, cleansed and integrated for a holistic, real-time view that supports timely reporting and analysis.

Best Practices for Analytics Across the Student Life Cycle

Progressive universities and colleges are already implementing **data integration, data visualization and analytics solutions** across the student life cycle to empower decision makers. In our work with many leading higher education institutions, we have identified three best practices (see Figure 1) that are fundamental to the successful application of analytics across the student life cycle:

- Integrate data across your institution.
- Equip all decision makers with self-service analytics and data visualization capabilities.
- Utilize advanced analytics to identify current and future trends for informed decision making.

Integrate Data Across Your Institution

Colleges and universities collect vast amounts and types of data. But it's typically spread across different schools, departments and campuses in various formats and multiple systems, making it a huge challenge to aggregate, connect and distribute to users.

To bridge the gap, IT and institutional research departments will typically stretch their limited resources to support departmental reporting requests. But handoffs and

processing can take time, rendering the information contained in the reports out of date and less useful. Furthermore, most traditional reporting solutions are either separate from the systems and data used by other departments, or are designed to report on information in one system. As a result, they provide a very limited (or siloed) view of just one aspect of the institution or student life cycle.

Today's decision makers need a comprehensive, holistic and predictive view of what's happening throughout their institution and the student life cycle. And data integration – combining data from a wide range of departmental systems – is the foundation for making this possible. When analytics is applied to integrated data, you gain deeper insights, which can drive decisions that can ultimately lead to higher enrollments, greater student success, improved retention and graduation rates, and greater contributions from alumni and donors.

Equip All Decision Makers With Self-Service Analytics and Data Visualization Capabilities

The days of “ask-and-wait-for” reports and OLAP cubes for traditional BI are fast becoming a thing of the past. Today's decision makers need secure, immediate access to interactive reports, as well as the ability to instantly and visually explore data related to a problem without having to wait for each iteration.

As a best practice, your institution should use self-service analytics (such as dashboards) to put data, analytical tools and insights into the hands of those who need them the most. For example, intuitive, interactive dashboards empower decision makers to visually interact with data; answer questions quickly; make more accurate, data-driven decisions; and share their findings with others. This kind of self-service model also:

- Eliminates the back-and-forth conversation between the user and the IT department, which can lead to misunderstandings, delays and costs.
- Allows many users to explore and interact with all relevant data quickly and easily, slicing and dicing data as needed to uncover hidden opportunities, identify key relationships and make more precise decisions faster.
- Empowers people to conduct what-if scenarios to anticipate the full impact of decisions before they make and implement them.

Self-service analytics and interactive, visual data discovery, exploration and visualization tools put lightning-fast insights within everyone's reach, while ensuring IT maintains governance and control over the underlying data.



Figure 1: Three best practices for applying analytics across the student life cycle.

Utilize Advanced Analytics to Identify Current and Future Trends for Informed Decision Making

Once people have easy access to integrated data and self-service analytics, you'll find that they quickly learn to ask more sophisticated questions and want to solve more complex problems. Using advanced analytics techniques such as forecasting, predictive modeling, machine learning, statistical analysis and optimization on data about students, resources and more, they can go beyond simply accessing and reporting information. Now users can answer questions such as, "How many first-year students dropped out each month of the school year?" and "Why did these students drop out and what is the likelihood more will drop out in their sophomore year?" And they start to think ahead and ask, "What will happen next?" and "What if this trend continues?"

ANALYTICS IN ACTION

The **University of Oregon** used analytics to find out if its merit aid was being used effectively to boost enrollment rates.

The University of Oregon used SAS® to develop a "financial aid simulator" for administrators to redesign the merit aid program to recruit high achievers more effectively. It 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.

Opportunities to Apply Analytics Across the Student Life Cycle

Let's take a closer look at examples of how higher education institutions are using advanced analytics and data visualizations to optimize key phases of the student life cycle, including:

- Recruitment and marketing.
- Operational efficiency and resource management.
- Student retention.
- Advancement.

We'll also share examples of higher education institutions that are already using advanced analytics in these areas. All have seen impressive success in using advanced analytics to drive change and transform their processes, decision making, operations and funding.

"We could see instantly what would happen if we gave them \$5,000, or \$4,000 or \$6,000. SAS allowed me to dive in and model exactly what kind of aid program we could afford that would also maximize our enrollment of high-quality students."

Jonathan Jacobs
University of Oregon
Director of Enrollment
Management Research

Recruitment and Marketing

Higher education institutions face fiercer competition for students than ever before. When recruitment and marketing departments can access the right information and insight at the right time, they can get answers to questions such as:

- How many applications have we received to-date compared to this time last year? The last three years? By major? By demographic?
- Based on application trends for a specific major over the last three to four years, what should we forecast for next year?
- Are students with higher SAT scores more likely to be engaged throughout campus and perform better academically? Are they more likely to graduate? Are first-generation students more likely or less likely to get more involved in campus?
- How can we segment recruitment data by department, major, state, county and high school to develop and enhance recruitment plans and initiatives?
- How can we attract students who will be successful and want to complete their degree here?
- Are we using our merit/financial aid effectively?

Operational Efficiency and Resource Management

Regardless of an institution's size and resources, there's never enough to meet every demand. Administrators need to optimize their utilization of complex and interdependent resources to achieve the institution's mission as effectively as possible. Data-informed decisions make this possible. When department chairs, program managers, professors, faculty and instructors, operations and facilities management can access the right information and insight at the right time, they can:

- Optimize their academic program mix to offer programs that appeal to the target student population and prepare them for evolving job markets.
- Determine what they are doing well in high-performing classes and what's causing low-performing classes to underachieve.
- Ensure that academic departments schedule enough sections of classes to meet demand and enable students to graduate on time, taking into account forecasts of student enrollment, course profitability, staff/student ratios, resource planning and allocation information (including classroom facilities, budgets and student parking), and more.
- Allocate or hire enough qualified professors and instructors to staff scheduled classes.
- Track what classes students are currently seeking to determine whether to open additional sections, move classes with smaller enrollments to smaller classrooms to free up space, or even cancel certain classes and redeploy faculty to more sought-after classes.

- Predict when growing online programs will begin to run short of computing capacity so staff can secure funding for new computing resources.
- Determine how students do in online courses vs. in-person courses to ensure quality of instruction across all classes.
- Use student survey data to provide a benchmark to instructors regarding their performance.
- Continually monitor student/teacher ratios and teacher qualification ratios (full time vs. part time and level of advanced degree) – variables critical to providing high-quality instruction that meets accreditation requirements and is accomplished cost-effectively.

ANALYTICS IN ACTION

Sinclair Community College is using SAS software to better understand student registration, success and outcomes to increase enrollment numbers. “Enrollment had been declining over a five-year period, and we were unsure why,” says Karl Konsdorf, Director of Research, Analytics and Reporting at Sinclair. With SAS Visual Analytics, Sinclair can analyze student enrollment from different angles and generate a wide range of reports needed to improve student retention and outcomes. For example:

- Daily enrollment management reports give deans and directors insight into how Sinclair’s enrollment compares to previous years.
- A degree audit report within SAS Visual Analytics allows Sinclair’s chairs and advisers to look at students’ degree progress, pinpoint the students who haven’t been enrolled within the last year, and view them by advisor, school, major and more.
- Staff can also get a list of all students who are close to completing their degrees – then reach out to advise them on courses to help them complete their studies.
- SAS Visual Analytics allows the College Credit Plus office to look at historical enrollments and see if they differ by region, high school, course, demographics and more, as well as turn data into helpful fact sheets for high school administration. This practice has helped to make College Credit Plus one of the fastest-growing programs at Sinclair, with 25-33 percent increases in enrollments year over year.

“With SAS Visual Analytics, we provide the reports for staff to go into the system, pick the department they’re interested in, and pivot down to get to the information in a self-sufficient manner,” Konsdorf said. “In fact, we condensed 1,600 reports down to just 20 reports.”

“We’re seeing anywhere from 25 percent to 33 percent increases in enrollments year-over-year ... We’ve been able to use data gleaned from SAS to position Sinclair as a leader in higher education.”

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

Student Retention

Every school wants to maximize retention and graduation rates. But without the right data-driven insights, it's difficult for retention staff to identify which students are likely to deregister, as well as proactively contact students to prevent their attrition. Nor can they understand and proactively mitigate the most common causes of attrition.

The key is giving retention staff access to the right information and insight at the right time so they can:

- Proactively identify at-risk students in order to retain them.
- Calculate retention or graduation rates of students and better understand which students are most at risk of dropping out or transferring.
- Know how many students in each major are retained each year and where the greatest attrition is so they can make program changes to reduce it.
- Routinely identify at-risk students who might be having problems and create interventions to try to prevent them from leaving.
- Identify strategies that can be put in place to properly advise at-risk students and measure the outcomes of these programs to ensure they are effective.
- Analyze data regarding performance-based funding indicators such as course completion, time to degree, transfer rates, the number of degrees awarded, and the number of low-income and minority graduates.

ANALYTICS IN ACTION

[Des Moines Area Community College](#) (DMACC) uses analytics and data visualization to help students prosper in the classroom and beyond.

With SAS data management and reporting capabilities, administrators and educators throughout DMACC can use data to identify at-risk students and help students select the right coursework. "Now staff members throughout the college can access data," says Joe DeHart, Provost at the DMACC Newton campus. "They don't have to go through my department, so it extends our reach." Reports that used to take weeks and months are now completed in minutes or seconds. This has freed DeHart's team to explore data in more detail.

"SAS has become the linchpin to all that marries what we keep internally with what we're looking at externally - whether that's benchmark data, unemployment insurance data or national student clearinghouse data," DeHart says. "And with SAS, I know all the fields are correct, that the users can interact with the data, and it's always going to be correct."

"SAS provides an overall snapshot of the health of our institution, and insight into how programs, processes and systems within DMACC impact our students."

Joe DeHart
Provost, DMACC
Newton Campus

Advancement

As budgets tighten, endowments shrink and needs increase, fundraising becomes a top priority. But in order to conduct complex and successful fundraising and endowment campaigns, institutions must be able to access and consolidate accurate alumni, donor and prospect data, as well as statistically analyze that data to determine who is most likely to donate. With the right software and services, they can:

- Easily manage, store, share and analyze alumni and donor information.
- Save time and money by cost-effectively targeting those most likely to give.
- Increase donations by uncovering qualified prospects who might have been previously untouched.
- Generate a list of highly qualified prospects - each scored and ranked by propensity to give.
- 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.

ANALYTICS IN ACTION

The Office of Advancement Services at a large state university needed to find new major donors - and it used SAS to efficiently identify and target them. Using SAS® Enterprise Miner™, development staff created predictive models to determine who is most likely to give major donations. The analysis uncovered more than 1,000 new prospects who hadn't been contacted in five years. By focusing follow-up efforts on these qualified prospects, the Office of Advancement Services has saved time and money while increasing donations. As a result, the university will be able to reach its fundraising campaign goals faster - and ultimately make the university more sustainable.

Making Strategic, Scalable Technology Investments

As people become experienced data and analytics consumers, they start to ask more sophisticated questions that require deeper levels of analysis. They want to go beyond knowing how many students they currently have, for example, to understanding how they can make students more successful, why certain students are struggling, and how to best support them to maximize their achievement.

But this will require giving them access to more data, more detailed reporting and more powerful analytics and visualization software. So it's important that as you build out your reporting and analytics solution, you invest in scalable software that delivers advanced data management and analytical capabilities to meet current and future needs.

How SAS® Can Help

SAS offers comprehensive, fully integrated solutions for data management, data visualization, reporting and analytics that you can deploy as your needs evolve (e.g., as your users move from individual analysis to advanced, exploratory analytics).

With SAS, you can do so much within one, integrated environment. The software supports data access, data integration, data quality, data prep and visual data exploration and discovery, as well as dashboard and report generation and advanced analytics and modeling. And as your data needs increase (due to growth in data volume, velocity and variability) and user demands change, SAS can easily scale to view all relevant data quickly and easily. So you can explore more options, uncover hidden opportunities, identify key relationships and make precise decisions faster than ever before.

Data Management

To make the most of every decision, business move and student interaction, you need high-quality, trustworthy, well-integrated data. And with [SAS Data Management](#) - an industry-leading solution built on a data quality platform - you can fully exploit, integrate and govern your data. It allows you to access your data regardless of where it's stored - including legacy systems and cloud environments such as Hadoop. And because the software's underlying technology is fully integrated, you're not forced to work around a solution that's been cobbled together. All of the functionality - from data quality capabilities to data federation technology - is part of the same architecture. For example, you can prepare your data for visualization, analytics or operational use while simultaneously ensuring data quality, transparency and accountability.

Data Visualization and Reporting

[SAS data visualization](#) gives you the information you need to make fast, informed decisions. No matter the size of your organization or data, you can explore all relevant data quickly and easily using interactive data visualization software. Look at more options, uncover hidden opportunities, identify key relationships and make precise decisions faster than ever before. Self-service, ad hoc visual data discovery and exploration put lightning-fast insights within everyone's reach.

As illustrated in Figures 2 and 3, SAS helps users quickly create interactive reports that are attractive and meaningful - and easily share them via the web, mobile devices and Microsoft applications. Recipients can slice and dice the information however they want, using filters and drill-through capabilities.

Users can get insights immediately, no matter where they are. Decision makers can access and explore dashboards and reports easily from tablets and smartphones, anytime and anywhere. With data visualization tools powered by analytics, answers are always within reach.



Figure 2: Example of dashboard showing enrollment demographics.

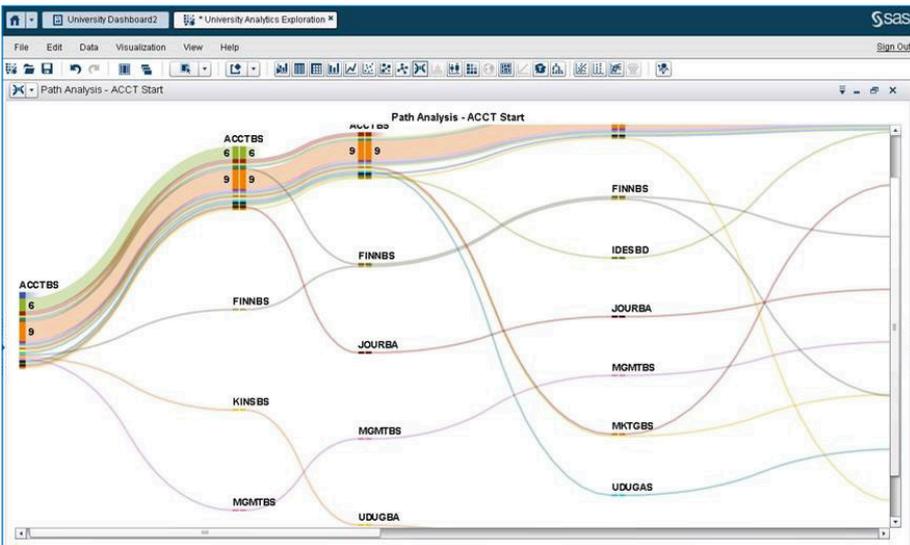


Figure 3: Visualization of student progression with a Sankey diagram.

ANALYTICS IN ACTION

Canterbury Christ Church University (CCCU) provides higher education for 17,000 students, including 1,000 international and EU students. Using SAS, CCCU built a suite of reports that provide insight into the student journey, encompassing initial application, offer, enrollment, education, graduation and employment.

“The intuitive interface means that users simply pull data onto a viewing pane, and the system builds the visuals. This allows us to highlight critical information to the senior managers rapidly and easily, with drill-down to the underlying data, empowering them to make evidence-based decisions,” explains Simon Houlding, Assistant Director of Planning and Reporting at Canterbury Christ Church University. “Combined with the practical aspects of time savings and data accuracy, SAS Visual Analytics forms a critical part of CCCU’s strategic program to improve and enhance the student experience.”

Advanced Analytics

IDC research shows that SAS has a commanding 31.6 percent market share in advanced analytics – well more than twice that of our nearest competitor.¹ SAS dominates the market because we know it’s not just having advanced technology that matters – it’s how far it can help you advance your organization. Our advanced analytics solutions are infused with cutting-edge, innovative algorithms that can help you make the best decisions possible, unearth hidden opportunities and solve even the most intractable problems.

Our advanced analytics can run on **in-memory** platforms that provide processing speeds up to a hundred times faster than traditional environments. In addition, as illustrated in Figure 4, it provides an integrated environment for descriptive and predictive modeling, data mining, machine learning, forecasting, optimization and more. Educational leaders can move from reactive decision making (“What is our retention rate?”) to proactive decision making (“Which students are at risk of dropping out, and are current interventions successful?”). Decision makers across your organization can use SAS Analytics to make new discoveries, solve complex problems and ultimately improve student outcomes.

IDC research shows SAS with a commanding 31.6 percent market share in advanced analytics – well over twice that of our nearest competitor.¹

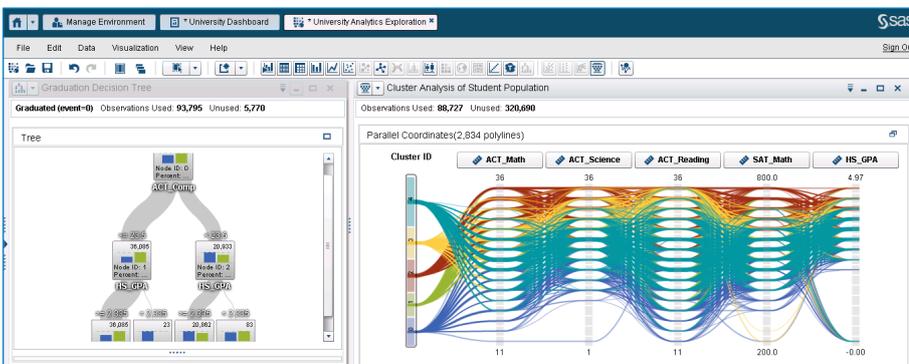


Figure 4: Examples of advanced analytics: decision trees and cluster analysis

¹ IDC, MARKET SHARE: *Worldwide Business Analytics Software Market Shares, 2015: Healthy Demand Despite Currency Exchange Rate Headwinds*. By Dan Vesset, Chandana Gopal, David Schubmehl, Stewart Bond and Carl W. Olofson. July 2016.

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, please visit sas.com/education.

To contact your local SAS office, please visit: sas.com/offices

