+ WHITE PAPER

What Is Predictive Modeling?

Improving student success in higher education with analytic technologies and practices.

Is college worth it? This fundamental question is shaking the core of higher education. In the US, the cry for greater accountability from higher education institutions has never been louder or more omnipresent.

Consider the following statistics from Next Generation Learning Challenges:

+ Only 42 percent of young people who enroll in college complete a bachelor's degree by the age of 26. Just 12 percent complete an associate's degree.
+ By 2018, 63 percent of all US jobs will require some sort of postsecondary education.
+ In 2008, the average wage for adults 25 and older with a four-year degree was $60,954, compared to $33,618 for those with only a high school diploma and $24,686 for those with no high school diploma.
+ Nearly 22 million new workers with postsecondary degrees will be needed by 2018, but it is estimated that the US higher education system will fall short of that number by three million graduates.

Degree awards, student job placements, and retention rates are receiving ever-increasing national attention, and demand for measurable progress toward meaningful goals is at an all-time high. Schools, eager to oblige, are shifting their focus to "student success" (see Jenzabar whitepaper "*Achieving Meaningful Student Success*"), and working to deliver the results required in a 21st century education. "Higher education has been holding itself accountable—at the institutional, system, and association levels—long before 'accountability' became a buzzword (Cowan, 2013)." The mandate has always been clear, but the methods must adapt to a constantly evolving global economy and shifting student demographics. That's where predictive modeling comes in.

Forward-thinking colleges and universities are turning to analytic tools and statistical techniques employed by the business sector to gain insight into not only the factors that impede student retention, but also the positive elements that contribute to student success.

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Not All Technology is Created Equal

Forward-thinking colleges and universities are turning to analytic tools and statistical techniques employed by the business sector to gain insight into not only the factors that impede student retention, but also the positive elements that contribute to student success. Predictive modeling—the practices and technologies used to find patterns and connections in data—was first developed in academia and government research laboratories. Data collection processes and data mining systems have been refined over many years of deployment in a multitude of business sectors. Modern predictive modeling tools are based on industry standards and are designed to integrate into existing infrastructures for optimal accuracy, minimal data loss, and the most complete picture.

In the higher education sector, there is a jumble of information regarding predictive modeling technologies and practices available to institutions. The market is full of vendors, software, and programs that claim to impact persistence. Schools are clamoring to find (and plug in) the "magic black box" of retention. But what makes a student successful is not the simple national story people want it to be. High school GPAs and standardized test scores, once viewed as key predictive indicators of student success, are now seen as simply one strand of an intertwined set of data that tells the complex story of student outcome.

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One thing is clear, however, retention experts agree that high-quality interventions undertaken as early as possible when a student starts to show signs of being at risk (or even before) are crucial to retaining that student. Predictive modeling, when implemented as part of a complete student success program, can give both the institution and the student a leg up toward clearing the many hurdles on the road to completion.

What is Predictive Modeling (And What is it Not)?

Predictive modeling seeks to discover hidden relationships in data. Leveraging a clear picture of past and present behavior, predictive modeling uses statistical analysis to generate a confident simulation of future behavior. Higher education institutions can use that insight to positively impact student trajectories and influence outcomes.

Predictive modeling designed specifically for higher education is a powerful tool that pulls together a wide variety of institutional and personal factors, and then analyzes them to elucidate what makes a student more or less likely to succeed at a particular college or university. The system identifies students that need help very early on, often before a student even knows he/she is in trouble, so the institution can intervene with the appropriate support resources that the student needs to persist. Implementing a predictive modeling-based initiative also helps institutions develop data-informed tactics to support all students in transitioning into successful alumni.

What is Predictive Modeling (And What is it Not)? (Continued)

An impactful predictive model for higher education has the following characteristics:

+ Supports the specific mission of the institution. It's highly customizable to reflect the unique culture and purpose of the institution (not one-size-fits-all).
+ Collects data continuously throughout the term and student lifecycle. Data is reported on in real time (not static).
+ Accommodates a host of complex data, including non-cognitive predictive indicators (not just yes/no variables or numerical data points).
+ Involves a collaborative team process and includes the day-to-day software tools to track workflows, communications, progress, and outcomes, so the entire campus team knows who is doing what follow-up and when (not a single plug-and-play box used exclusively in the retention office).
+ Provides clear visualizations and dashboards, delivering a complete overview of each student through an easy-to-use interface that anyone with permission can view (not relegated to analysts or requiring extensive training).
+ Encompasses a broad range of data points covering every aspect of a student's life (not just what happens in the classroom).
+ Drives institutions to develop improved student-centric business practices, including helping every student reach full potential (not just interventions for high-risk students).

Why do Students Persist?

Motivated
Self-regulating
Self-reflective
Resilient
Supported financially and emotionally
Finds good fit
Goal directed
Conscientious
Connected to resources
Engagement-oriented

Source: Gore & Wiseman

Identifying True Risk Factors

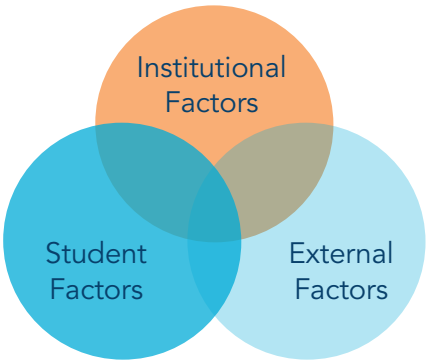
Why do students persist? Although there are some commonalities, the answer is different at every institution. Grades, ACT, SAT, Course Placement Exams, and the like have long been thought of as the "standards" that predict student success. We now know that student persistence is a more nuanced phenomenon, and what brings a student through to completion at one institution is not necessarily the same at other schools.

In fact, more often than not, there are many surprises when a school starts taking a close look at what factors predict high or low student engagement on their campus. For example, if a school has set up an effective intervention or support program in one area (e.g., disciplinary issues or support for first-generation students), that factor can show up as a positive influence on student outcome. In addition, we cannot even assume that a predictive model developed for a particular program at a particular university is valid for other programs at that same university. Student success is personal.

Greater Focus on Non-Cognitive Factors

So what factors can we examine? Recent research suggests that non-cognitive factors—behaviors and attitudes that are distinct from the traditional verbal and quantitative areas measured by ability or achievement tests—moderately to highly correlate with student outcomes. Collectively, non-cognitive factors can increase the accuracy of prediction of performance and persistence by as much as 30 to 40% (Gore & Wiseman).

Non-cognitive variables are often malleable and can be supported, developed, or remediated. Many campuses have existing programs focused on enhancing non-cogitative abilities, such as: counseling services, honors programs, advising, developmental education, co-curricular affinity groups, residential life, and recreation/heath programs. Higher education institutions have long known that these are the important components of both college and career readiness.



All the Information You Need

Predictive modeling can provide highly accurate insight into what drives students to succeed or fail. The more high-quality data you feed into the system, the more focused the picture that emerges. Retention systems that combine text and Web or survey data with structured data from your campus learning management system (LMS), student information system (SIS), and enterprise resource planning (ERP) system enrich the prediction calculations. Having an abundant and varied dataset also reduces sources of bias in the model.

"Data mined from the LMS and SIS typically provides the basis for student retention CRM analytics. Some of these applications also provide for the additional capture of relevant student data provided directly by faculty and advisors. The value of these student retention tools is two-pronged: The analysis of the data relevant to the student's engagement and success; and the functionality to act on these observations to increase engagement, resolve problems, and improve student outcomes (Thayer, 2013)."

It's important to also note that data is not static. Factors that influence student success are continually evolving. Retention systems must be flexible to adjust as situations change. Real-time data exchange and reporting is essential for the earliest alerts and warning systems. In addition, student success factors are also interdependent. Uncovering and visualizing the correlations among the predictors of what it takes for a student to pursue a degree through to completion is where predictive models can really shine.

Predictive Model Data Point Examples:

Student Factors

+ How rigorously prepared for higher education is the student?
+ What identifiable goals and intentions does the student indicate?
+ Does the student attend class?
+ How resilient to stress is the student?
+ What is the student's level of commitment to their educational goals?

Predictive Model Data Point Examples: (Continued)

Institutional Factors

+ How robust are student and academic services?
+ What are the financial aid options?
+ How does the choice of major affect retention rates?
+ Are recruitment efforts focused on attracting students who represent a good institutional fit?

External Factors

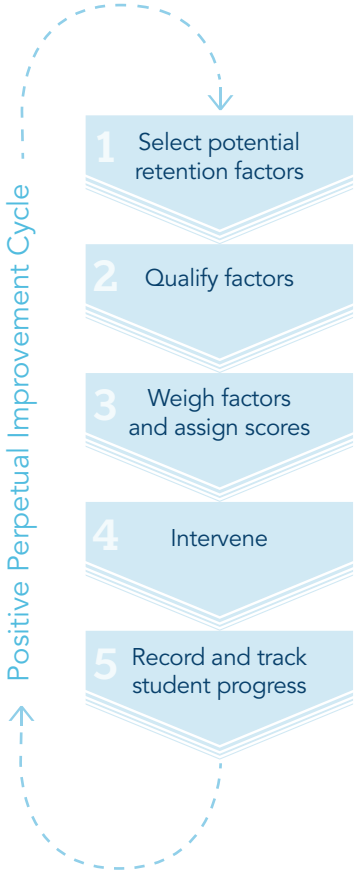
+ Do work programs, athletics, or study abroad endeavors play a role?
+ What is the family's economic situation?
+ How well is the student adjusting socially?
+ To what extent is the student involved in campus activities?
+ What is the student's geographic distance from campus?
+ What are the real-life challenges the student is facing, such as work commitments, family obligations, and financial constraints?

Taking Intelligence-Driven Action

Many schools have found that launching a campus-wide initiative to promote a student-centric approach to business practices is best taken in smaller steps. Given how many factors influence student success, some of which are outside of an institution's control, predictive modeling can be intimidating. A strong technology partner will demystify the complexities of the system and help establish a perpetual cycle of ever-increasing improvement for the institution.

One of the many benefits of a robust retention management system is its ability to learn over time. The best way to improve is to get started. Most analysts recommend beginning with a dataset with at least a three-year look back. As the system feeds into itself, a positive perpetual improvement cycle ensues: (1) select potential retention factors, (2) qualify those factors, (3) weigh factors and assign scores to each, (4) perform interventions, (5) record and track student progress over time, and then back to (1), and so on.

Focusing on all of the potential factors that can lead to attrition provides the key to unlocking retention situations before it's too late—when there's still time to provide the support interventions that can make a difference. The mere generation of a risk signal, however, does not convey enough information to design meaningful personalized interventions. Providing everyone on campus a holistic, analytical view of student progress can preemptively identify at-risk students and help determine what resources or support a particular student needs. Data visualization for reaching diagnostic insights and case management tools for intervention management are essential to help maximize positive outcomes.



Retention is Everyone's Business

Much is riding on higher education institutions to deliver on the promise of student success. "Educational characteristics of the workforce play an important role in the dynamics of an economy. A well-educated workforce is likely to be more productive, and highly skilled workers tend to have much lower unemployment rates in economic downturns (Rosengren, 2011)."

Predictive modeling is a valuable business tool that institutions around the world are successfully leveraging to develop impactful strategies around recruitment, retention, early intervention, and other student success related issues. It can provide highly accurate and insightful intelligence, but it's not a panacea. Student success is a fully-integrated process, not simply a model. The predictive model itself is only as useful as the people who take the actions to support the student. Responsibility extends across the entire campus. An effective retention plan affects every administrator, faculty member, staffer, and student. As colleges and universities move into the age of data-driven decision making and evidence-based business models that graduate the well-prepared workforce of the future, they are beginning to demonstrate that college is more than "worth it" in the 21st century economy.

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Burt is responsible for Jenzabar's student success solutions products, including Jenzabar Retention. He has led several software companies as Chief Technology Officer, Vice President of Engineering, and Vice President of Product Management. Burt received a Bachelor of Science degree in Computer Science from MIT and continued graduate studies at the Sloan School of Management.

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Works Cited

Bill & Melinda Gates Foundation. (2010). Next Generation Learning: The intelligent use of technology to develop innovative learning models and educational pathways.

Cowan, K. (2013). Higher Education's Higher Accountability. American Council on Education.

Gore, P., & Wiseman, J. (April 30, 2014). The Retention-Focused Institution.

Next Generation Learning Challenges. Retrieved from http://nextgenlearning.org/program-goals

Pratt, M. K. (June 9, 2014,). This university CIO uses analystics to help boost graduation rates. Computerworld, pp. 10-12.

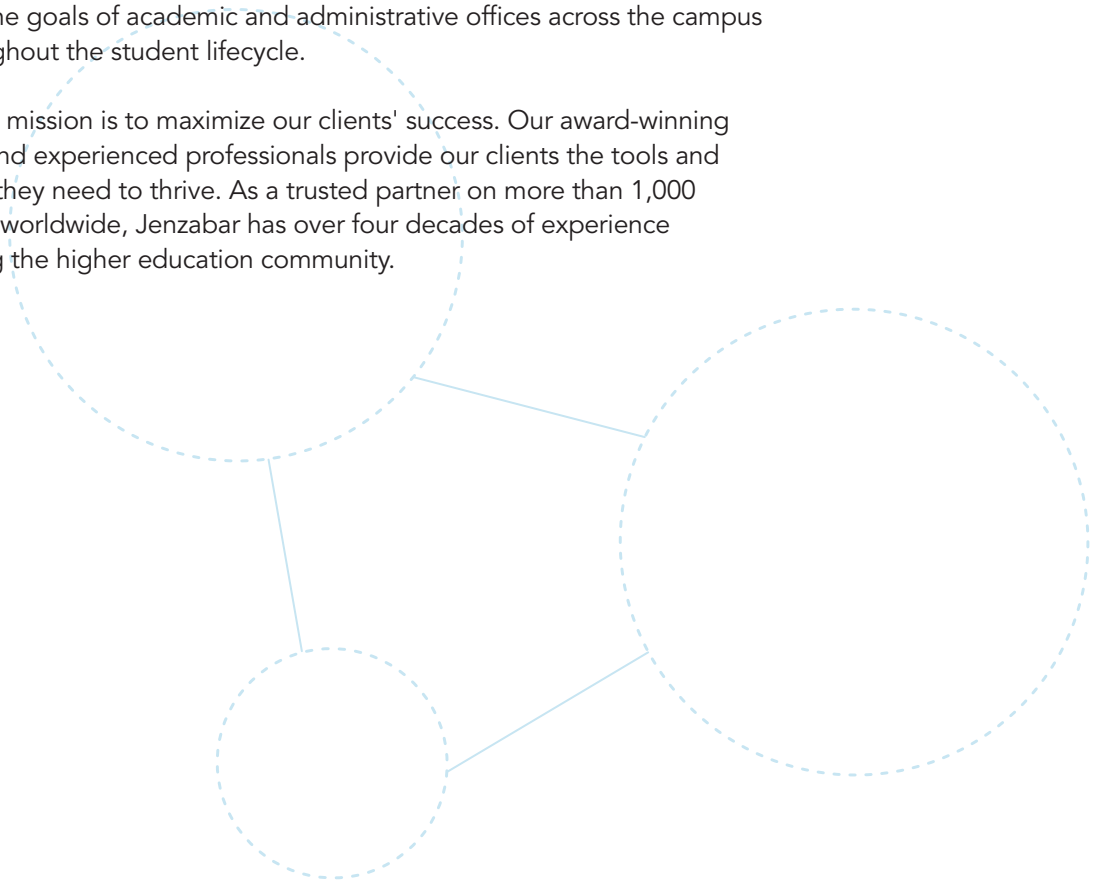
Rosengren, E. S. (2011). Higher Education and the Economy: The View from the Boston Fed Chief.

Thayer, T.-L. (2013). The Coming of Age for CRM in Higher Education. Gartner.

About Jenzabar

Jenzabar is a leading provider of enterprise software, strategies, and services developed exclusively for higher education. Our integrated, innovative solutions advance the goals of academic and administrative offices across the campus and throughout the student lifecycle.

Jenzabar's mission is to maximize our clients' success. Our award-winning software and experienced professionals provide our clients the tools and resources they need to thrive. As a trusted partner on more than 1,000 campuses worldwide, Jenzabar has over four decades of experience supporting the higher education community.



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