Businesses are outpacing higher education in using Big Data, which provides a richer analytical understanding of how people and operations can better meet customers’ needs and objectives. Rather than simply holding this information, companies are sharing it with their customers, co-creating new value in the process. Faced with pressure to improve quality outcomes while cutting costs, colleges and universities can similarly build new value relationships with students, leveraging the data collected at every step of the enrollment, financing, and instructional process to support greater student success. This is a key IT trend that should drive institutional strategy and policymaking in future years.

Key Takeaways

The business world is beginning to deploy Big Data to empower consumers.

Within more and more industries, Big Data represents a transition from narrow pockets of reportable data to a fine-grained, integrated overview of the entire business. Powered by ever-richer computing resources, Big Data attempts to capture a 360-degree view of everything that happens in the course of doing business: customer experiences, organizational processes, and trends that emerge from analyzing these activities.

In addition to using this information to provide better service and more targeted products, businesses are also allowing customers to leverage this information. WebMD, for example, supports numerous “knowledge communities” that share data about specific conditions and illnesses, which empowers consumers to interact more efficiently with the health care system. The travel site Kayak unbundles airline pricing packages to help users navigate ticket purchases, and LEGO enables its Mindstorm community to design future products. United Health care looks across its entire membership to determine, for example, potentially harmful drug interactions and then alerts affected individuals.

Government agencies are also headed in this direction. The Department of Veterans Affairs created a Blue Button Project in which veterans can choose to pool their health records with those of others. In return, they get access to similar vets’ health data so they can search for better health care providers and relevant treatment approaches.

This type of information-driven “consumer agency,” however, is largely absent in the higher education context, where information gathering and usage is still decidedly asymmetric. Institutions know much more about students (and potential students) than students know about institutions and pathways to success within them.

Institutions are not effectively leveraging student information.

In the course of attending school—“conducting business,” in commercial terms—students generate an enormous volume of potentially valuable information: course selection and registration, financial and work arrangements, class participation and study group activity, online resource usage, and textbook purchases. This is Big Data’s raw material, and much of it could be aggregated and redeployed to help students make better decisions. More often than not, though, this information is trapped in a “black box” from which actionable knowledge is difficult to extract.
Seen in the broader context of today’s technology-enabled learning, the student stands at the center of a network of information-rich connections, all of which are Big Data opportunities (see figure).

For example, community colleges are beginning to recognize that particular courses represent bridges from remediation to for-credit coursework. Providing that “momentum point” data to students could help sustain their progress.

Institutions must deploy Big Data to improve quality and remain relevant.

As the cost of tuition soars, colleges must deliver what students and their families are paying for. Unfortunately, a recent survey of 2,300 undergraduates showed that 45% “demonstrated no significant gains in critical thinking, analytical reasoning, and written communications during the first two years of college” (according to the authors of Academically Adrift: Limited Learning on College Campuses). Even after four years, 36% showed no improvement.

At the same time, the proportion of nontraditional students is growing every year. Rather than characterizing their differences as risk factors, institutions need to rethink the way in which they provide and support educational services for these students.

Big Data, therefore, is far more than an exercise in collecting information and generating reports; it is a strategically important use of IT resources to improve educational quality and guide students to higher rates of completion.

With service-oriented Big Data, students and institutions can co-create value.

Services differ from products in that “exchange relationships” are created as the supplier and consumer co-create value. Unlike a manufacturer delivering an automobile, for example, a university and its students collaboratively create a college education. The university’s resources include people, technology, processes, and facilities, while the student brings his or her finances, preparation, participation, and self-awareness. They share the responsibility to create learning, and Big Data can provide insight into how this relationship is working in real time.

“With this conception of college as a co-created thing, Big Data becomes immensely important because it allows you to unpack how this relationship is playing out in real time.”

—Louis Soares

Illustrations of this co-creation in action include:

- **Open Learning Initiative.** With 425,000 students in a web-based environment, this Carnegie Mellon project offers self-directed learning tools, adaptive instructional software, and informative data dashboards that predict future performance.

- **Saddleback College.** The proprietary SHERPA (Service-Oriented Higher Education Recommendation Personalization Assistant) engine uses a student’s profile of preferences, schedules, and past courses to suggest a course of study. The next iteration will factor in the success of other students with similar profiles.
Purdue University. Course Signals, developed at Purdue University, is an early-warning system that helps students manage their success throughout a course. It studies their performance and activity patterns to benchmark them against successful students.

Persistence Plus. This start-up, the “Weight Watchers of college completion,” uses a smartphone platform to bring behavioral science research to bear on a student’s profile. They are experimenting with social media tools and peer-group pressure to influence individual performance.

In high-performing institutions, Big Data is mission driven and focused on valuable analytics.

It is expensive to pursue a Big Data strategy, so institutional leaders must be convinced that it will yield valuable results. Before undertaking a Big Data initiative, university CIOs must fully understand the issues and pain points in their particular setting and then join the strategic planning process at a high level. IT leaders must show that their architecture proposals address vital information issues.

“Big Data is relevant when you understand the problem that someone’s trying to solve: a big problem in your world that’s costing somebody a lot of money or making someone fail.”

—Louis Soares

Reduce nonproductive credits. This consumer-oriented goal is particularly important for nontraditional students.

Redesign instruction delivery. This emphasizes a whole-course (rather than class) focus, learner-centered activities, on-demand assistance, and mastery-oriented modularity.

Redesign core support services such as human resources, academic services, plant operations, and finance to produce strategically useful data. IT infrastructure—administrative and academic ERP, assessment tools, and external information services—must underpin high-value, actionable analytics.

Optimize noncore services and operations.

Big Data requires smart public policies that address information-sharing issues.

Not surprisingly, Big Data creates a raft of knotty public policy concerns because it uses personal information in new ways. Policymakers should:

Create guidelines. How should this technology be treated to promote both social-environment sharing and student privacy? What represents fair use? Should students be able to opt out or otherwise control their data?

Review the data already collected. Where and how can this information supplement user-generated data to encourage better choices?

Fund the spread of personalization tools. Competitive grants might be helpful here, with a particular focus on institutions serving low-income and minority students.

In enrollment management, for example, institutions are beginning to corral Big Data to arrive at an optimal student mix that balances revenue with recruitment costs, diversity, and other factors. Using Big Data strategically, the most successful institutions:

Create a culture of completion and outplacement. This should be a major objective.