

# Data Analytics: A Gateway to Higher Education's Future

What it takes to build data-science degrees  
and literacy across the curriculum to drive enrollment  
and academic transformation

*By Jeffrey Selingo*





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**E**nrollment is the lifeblood of colleges and universities, and ever since the Baby Boomers flooded campuses in the 1960s, higher education has been in growth mode.

But after peaking in 2010-11, the number of undergraduate students in the U.S. has fallen precipitously. During the pandemic, nearly 1.3 million students disappeared from American colleges.<sup>1</sup> That decline raised alarms among higher education leaders that an enrollment cliff, projected to come with smaller high-school graduating classes starting in the middle of this decade, had arrived earlier than predicted. While graduate enrollment remains a bright spot—jumping 9 percent over the last decade—the numbers in many academic programs are anemic.<sup>2</sup>

What's clear in studying the trends is that the era of organic growth is over for higher education. A combination of demography and economics, with rising

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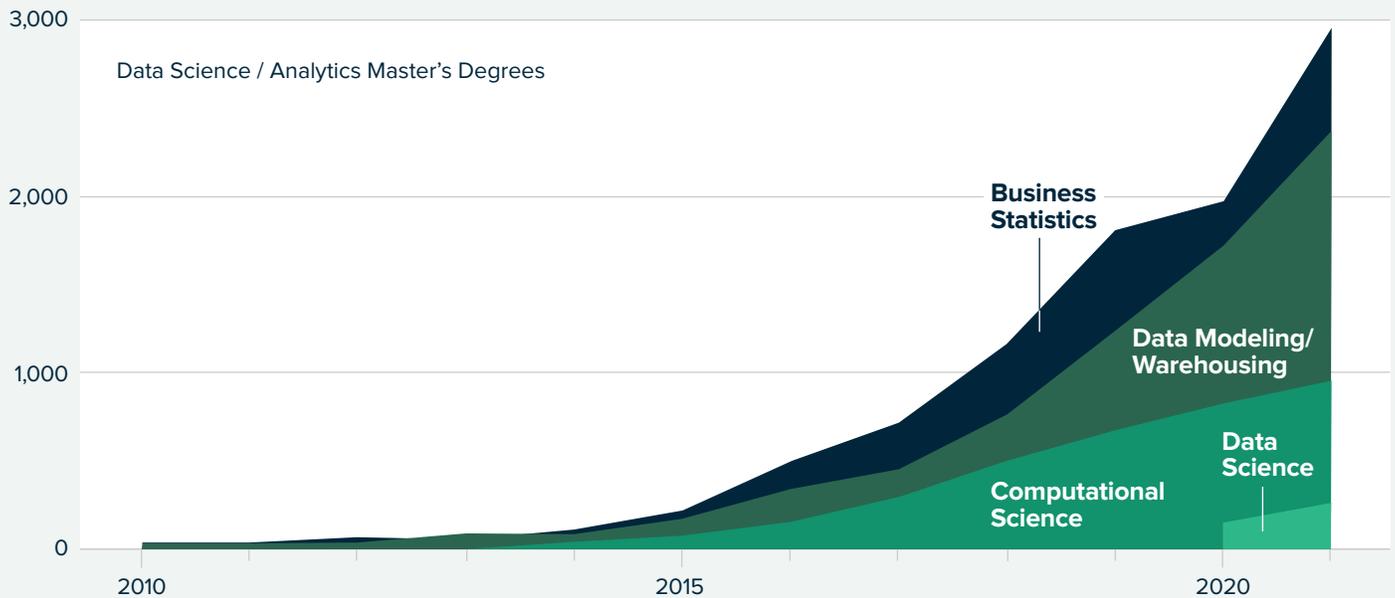
tuition and debt levels, is discouraging a large segment of students from enrolling in college.

But colleges needn't face a future of decline. It's important to remember that enrollment is a function of demand—and colleges and universities can create interest in their programs by what they offer. The problem is not a lack of learners, but rather a lack of alignment between the academic programs colleges

FIGURE 1

## A Surge in Data-Related Master's Degrees

In 2020, the National Center for Education Statistics added a “CIP code” specific to data science to better track the number of master's degrees in the field. Even before the introduction of the new code, the number of master's degrees grew substantially in other categories used for data science and analytics, including business statistics, data modeling/warehousing, and computational science.



Source: National Center for Education Statistics (NCES)

offer, what learners want, and what the job market requires.

We started to see this phenomenon emerge in the wake of the Great Recession as students flocked to academic disciplines they perceived as having a higher return on investment (ROI), mostly in STEM fields and business. The result is that the proportion of bachelor's degrees awarded in the humanities has plummeted, from 16 percent a decade ago to 11 percent today. In 2019, engineering and computer

science degrees surpassed all humanities degrees combined, both in proportion and sheer numbers of BA's. In 2021, the gap widened.<sup>3</sup>

### DATA SCIENCE AS A STRATEGY TO BOOST ENROLLMENT

Students are voting with their feet faster than institutions can add in-demand programs. A decade ago, computer science was all the rage among institutions as *the* discipline to boost enrollment. Now, it's data science.



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“Data science appeals to a wider range of students than computer science,” said Adam Weinberg, president of Denison University. Denison, with 2,300 students, was among the first liberal-arts college in the U.S. to start a data analytics major in 2016. Since then, the major has grown to be the sixth largest at the Ohio institution, where students must complete the program in the context of another academic domain (i.e., biology, economics, environmental science, philosophy).

Not only does data science appeal to a broader set of students, Weinberg said, the program also has a wider impact on the institution as a whole. For one, it is “a major driver” of admissions applications to the institution from students who have extensive interests in the liberal arts *and* STEM. Second, unlike computer science where there is a shortage of faculty, Weinberg said, “you can cast a wide net for data science faculty who come from across the disciplines.”

The transdisciplinarity nature of data science is critical to build the muscle colleges need to break free from traditional academic silos—so that data science isn’t that thing that the business school or the accounting department does. “Data is omnipresent in today’s world,” said Sridhar Sundaram, dean of the College of Business and Economics at California State University-Fullerton. “Our role in higher education is to develop this talent across disciplines.”

So, it’s essential that institutions deliver data science courses to learners everywhere on campus no matter the major given the importance of data literacy and analysis as a core skill in most jobs.

“Graduates aren’t going to have marketability if they don’t have data analytics incorporated in their courses,” said Christine Cheng, an assistant professor at the University of Mississippi. “And if students can’t get jobs, colleges are going to have trouble attracting them in the first place.”

Take the Texas Rangers baseball team, as an example, of how data has spread to every job, in every part of the organization. Of course, like every sports team, the Rangers use data to gain an edge on the field. But they also use data tools throughout the stadium to make predictions and provide real-time updates on everything from where people park to which concession location sells the most nachos.

## **A GATEWAY TO CURRICULAR TRANSFORMATION ACROSS CAMPUS**

The imperative to increase enrollment (or at least maintain it) and keep up with the demands of an ever-changing job market has many college leaders overwhelmed and struggling to manage various challenges facing their institutions.

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Building data science programs and infusing data literacy as a skill across campus, however, shouldn't be seen as a one-off effort. Rather, it can be a gateway to further innovation in how an institution's curriculum is designed, delivered, and measured in three key ways that even beyond this single discipline are driving the future of higher education:

First, the **curriculum is undergoing an unbundling** from a closed system of set of courses that leads to a degree to an open system that offers individual courses and skill development. Data analytics has been described as a basic competency for many jobs, much like a foreign language or computer coding was in previous eras. But unlike those academic disciplines, data science can be easily broken into chunks, allowing instructors to move quickly and introduce students to basic concepts and tools that get them hooked early on.

Second, once the curriculum and courses are unbundled, **individual competencies can be credentialed**. As students learn skills and tools, they can earn certificates and badges to show what they know to prospective employers—even before they receive any traditional degree.

Finally, **soft skills** are moving to the forefront in the curriculum. As students delve into data analytics, they get a unique vantage point for solving problems in operations, identifying new ones, and communicating solutions—all of which build the necessary soft skills.

## FOUR PILLARS TO SUCCESS

Still, revising the curriculum always feels like a gargantuan task in higher education whether it's changing a single department or the core requirements. Where should academic leaders start? How can they systematically build data analytics into academic programs? How might they balance data literacy as a foundational skill for all students while focusing on graduating more of them on time?

In my review of the literature and interviews with some two dozen academics, including provosts, deans, and faculty members, I have identified four pillars of successful data science programs:

### 1. Develop Industry Partnerships for Curricular Insights and Jobs for Graduates

Since the Great Recession, the No. 1 reason students say they go to college is to get a job.<sup>4</sup> But at a time when the skills and tools needed to keep up in any

FIGURE 2

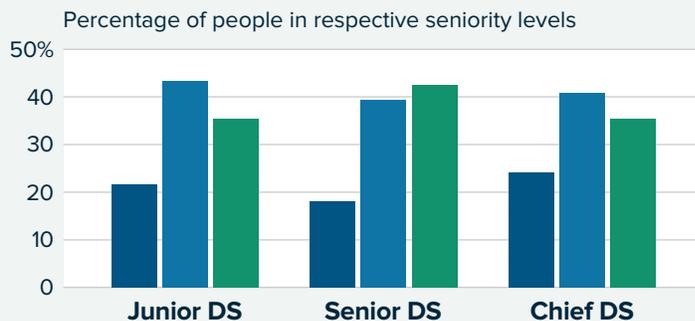
## Degree Up

The master's degree and PhD are most prevalent among data scientists no matter the seniority of the role.

Highest education level of data scientists across seniority levels

■ Bachelor's ■ Master's ■ PhD

Source: Analysis by Stich based on LinkedIn data, 2023



job are churning at an ever-faster rate, colleges and universities are struggling to keep pace. A decade ago, a much-cited Gallup survey revealed the huge gulf between industry and higher education: 96 percent of provosts said they were doing a good job of preparing students for success in the workforce, but only 11 percent of business leaders agreed.<sup>5</sup>

Since then, an increasing number of partnerships between universities and companies have sought to close the skills gap and prepare more students for careers. Such partnerships go well beyond the traditional ones where institutions buy products and services from companies but are instead much deeper—where companies and entire industries help shape the curriculum, provide their tools to institutions for students to use, and then hire many after graduation.

While faculty in many academic disciplines remain skeptical of such partnerships, without such alliances in a new and growing field like data science it's nearly impossible to launch a program. "The challenge is if we don't think more innovatively about the undergraduate curriculum, then we're going to continue to deliver the same material," said Cheng, at the University of Mississippi. "Maybe that worked in the past, but it's not the best showcase to provide opportunities for our students in a particular profession."

Ole Miss started its program in tax and data analytics in 2018 at the urging of KPMG, which needed employees with the ability to engage with data. "What I really appreciated when we started this program is that it wasn't restricted to people who wanted to just pursue careers at KPMG," Cheng said. Today, the tax and data analytics program has a 100 percent placement rate into jobs. "Our students are getting job offers all over the world because employers realize they're getting upscaled in skills they wouldn't get out of a traditional accounting program." Cheng added.

## 2. Stack Credentials to Meet Learners and Jobs

Imagine legacy degrees as a full meal, when sometimes all you need is an appetizer to placate

# Toward Data Science

In interviews, academic leaders and faculty members provided the following advice to building data science and literacy in a college or university's curriculum:

### Start at the top

Colleges with thriving data science programs, and where data analytics has crossed academic silos, tend to have deans, provosts, and even presidents who have pushed the initiatives. At Camden County College, administrators have allowed courses to operate with only two or three students in the new data science program when ordinarily such class would be canceled with low enrollment. "It's helped a lot to have that backing," said Anita Wright, an assistant professor.

### Find "banner carriers" in each discipline

Identify and encourage the early adopters in different departments and schools. "If banner carriers get on board, then it puts everybody else in the position of saying, 'well, if they can do it, so can I,'" said April Morris, a professor at California State University, Fullerton.

### Phase in technology

Many disciplines offer a single course that covers technology topics and tools, such as an accounting information system (AIS) course in accounting. "This isn't sufficient for the current needs of the profession," said Joy Gray, vice chair of Bentley University's accounting department. At the very least, Excel should be used in all accounting classes, with more advanced courses phasing in the use of additional tools, such as Alteryx.



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your appetite. Certificates, badges, and the associate degree can be the appetizer for data science programs—and when stacked together over time come to equal a traditional bachelor’s degree (i.e., the full meal). Once that bachelor’s degree is earned, students can take additional courses or certifications toward a master’s degree—typically while they’re working in the field—and then eventually move up to a Ph.D., if needed.

The good news for learners is that education credentials at all these different levels are in demand by employers looking for data analytics skills. Historically, colleges have “misaligned ourselves with what industry needs,” said Anita Wright, an assistant professor at Camden County College. Institutions offer advanced degrees when they aren’t required for entry-level jobs or build courses without consulting employers about the skills they’re looking for.

When Camden created a degree in data science in 2020, faculty members built it as an Associate of

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Applied Science (AAS degree) instead of a traditional associate of science degree to reduce the number of general education credits in the program. “That would have interfered with really developing the skill set that data scientists need,” Wright said.

The Camden program also embeds industry-based certificates into the degree. If students pass an Alteryx certification, for example, they not only get licensed, but the endorsement counts for a portion of their grade in the class. The certification can provide them access to an internship or job, even short of a degree.

The AAS degree is part of the learner pathway in data science, Wright explains, where students can exit to a job with a certification or an associate degree and then get back on the pathway to upskill for further certifications or degrees as they progress through their career. This pathway starts in K-12, where Camden is looking to offer online data science courses in high schools, where students can earn credit toward a degree. “Students in the high schools don’t know about

data science, their parents don’t know about this field and the jobs their kids can get,” Wright said. “When they learn about it, they become more interested.”

### 3. Harness Experiential Learning to Engage Students

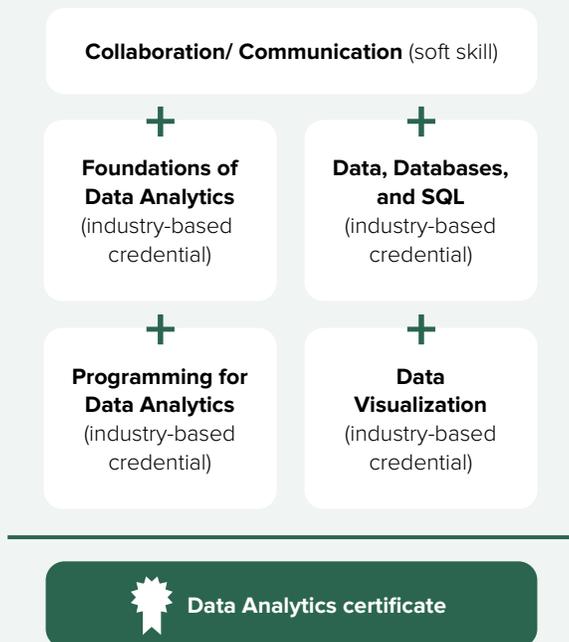
Experiential learning has long been recognized by educators as a difference maker for students. Hands-on activities deepen learning by connecting the

FIGURE 3

## Stacking Credentials to Career Pathways

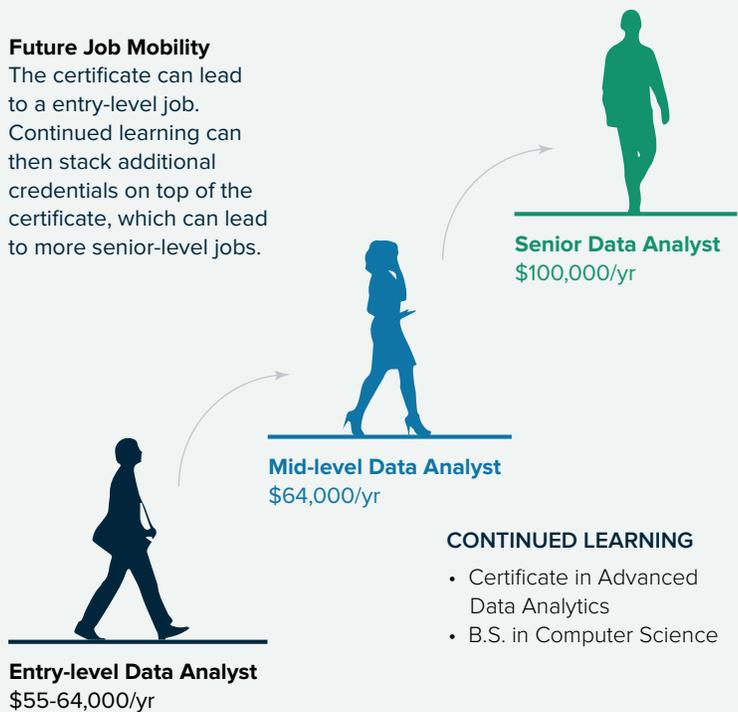
The Data Analytics certificate at LaGuardia Community College in New York illustrates how two-year colleges, as well as four-year institutions, can use industry-based credentials embedded in degrees to provide on-ramps to careers in data science and access to further education.

**Five credentials**—four of which offer technical skill certification—can stack up to a data analytics certificate.



#### Future Job Mobility

The certificate can lead to an entry-level job. Continued learning can then stack additional credentials on top of the certificate, which can lead to more senior-level jobs.



Source: LaGuardia Community College and Education Design Lab



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classroom to the broader world and focusing on how students actually learn by applying theory from the classroom to real work in the moment.

In data science, experiential learning is critical to hooking students and getting them ready for internships and jobs.

Consider April Morris's classes at California State University, Fullerton. Students are introduced to tools from the analytics company, Alteryx, which provides software and courses to colleges as part of its SparkED program. In one project, students identified patterns among recipients of the federal government's Paycheck Protection Program (PPP), which dispersed funds in the first year of the Covid-19 pandemic. In another project, students analyzed the reasons for employee turnover at a company and linked it to those who received a paycheck (more turnover) versus those with direct deposit (less turnover).

"I've had students say, 'I can't believe I can do this,'" Morris said. "I've had students who have competed against quite a few of Ivy League graduates because they've been able to show what they could do."

At Bentley University, in Massachusetts, analytics case studies that started in graduate courses have "trickled down" to the undergraduate curriculum as well, said Joy Gray, vice chair of the accounting department. "We have a goal of having an analytics case in every class that we teach," she said.

Exposing students to real-world work is increasingly critical as many obtain their first internship after their sophomore year, before they have had an opportunity to take advanced classes in accounting, for example. As a result, Bentley offers a two-day boot camp for students in the spring of their sophomore year to provide them with technical skills in analytics. "We want our students to have at least used whatever is thrown at them during their internship," Gray said.

#### **4. Blend Disciplines to Develop T-Shaped Graduates**

The idea of the T-shaped individual first emerged in the early 1990s. The vertical bar of the T represents a person's deep understanding of one specific subject matter—history, for example—as well as one industry, perhaps energy or health care. The horizontal stroke of T-shaped people is the ability to work across a variety of complex subject areas with ease and confidence.

The need for this ability is far greater today than it was two decades ago as the world becomes more complicated technologically. Take a task, such as detecting credit-card fraud. It requires skills in math, law, finance, technology, psychology, and political science.<sup>6</sup>

Of the four pillars, this is the one least developed among colleges and universities, according to my research. For the most part, data science remains

siloed in accounting departments and business schools, although data literacy is a critical skill increasingly required across disciplines. There is plenty of room for institutions to innovate here. A college that encourages data science as a complementary double major or a minor to other disciplines outside of business (much like Denison has) or data literacy as a foundational skill for every student is an institution that can inspire others to follow.

In an effort to break down disciplinary silos, Bentley recently rolled out a new undergraduate curriculum with a required first-year seminar focused on “wicked problems” that often require data analysis, Gray said. Similarly, Camden County College’s Wright is working to bring data literacy courses to high schools as well as colleges across the state. That work is focused

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on helping students build their own data science project. “It’s a really good way to attract people into data science,” Wright said, “because with just a little guidance they see how this skill set improves their way of making decisions about something they’re interested in.”

## The Path Forward

For decades, enrollment in higher education has grown organically as a greater proportion of students graduated from high school and went to college and historically under-represented students enrolled in greater numbers. But given economic and demographic trends, the era of continual growth is coming to a close. Colleges and institutions need to create programs aligned to the job market and implant in-demand skills throughout the curriculum. That’s where data science and analytics enters the picture. As reliance on data and analytics continues to expand across industries, it’s clear that data scientists as well as those with data analysis and visualization skills will have a far-reaching impact. As this paper summarizes, there are four pillars to creating successful data science programs that, when put in place, can also serve as an example for further curricular reform. In all, such institutional transformation can help colleges and universities not only survive but thrive in the face of shifting demographics and prove their value to an increasingly skeptical marketplace.

## Endnotes

<sup>1</sup> Karin Fischer, “The Shrinking of Higher Ed,” *The Chronicle of Higher Education*, August 12, 2022.

<sup>2</sup> National Center for Education Statistics, *Fast Facts*, <https://nces.ed.gov/FastFacts>

<sup>3</sup> Author analysis from Integrated Postsecondary Education Data System (IPEDS), <https://nces.ed.gov/ipeds>

<sup>4</sup> CIRP, Freshman Survey, <https://heri.ucla.edu/cirp-freshman-survey>

<sup>5</sup> Allie Grasgreen, “Ready or Not,” *Inside Higher Ed*, February 25, 2014.

<sup>6</sup> Jeffrey Selingo, *There is Life After College* (New York: HarperCollins, 2016): 30-31.

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