STRATEGIC DATA PROJECT

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Strategic Data Use in Higher Education

Improving Postsecondary Success with Data

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ABOUT THE STRATEGIC DATA PROJECT

SDP partners with state and local K–12 education agencies to build capacity for managing, analyzing, and communicating with data. SDP cultivates analytic talent through a two-year fellowship program, in-person and online trainings, and widely accessible tools and resources.

The Harvard Center for Education Policy Research launched SDP in 2008 to meet a need for analytical capacity in state and local K–12 agencies. Reform-minded school superintendents were experimenting with new programs and policies, but lacked the capacity to evaluate those efforts or to make data-informed decisions. Further, the No Child Left Behind Act of 2001 mandated that states collect and report detailed data on student progress and achievement, but many state and local agencies lacked the capacity to make use of those data beyond basic accountability reporting.

Since 2008, SDP has collaborated with more than 125 school districts, charter management organizations, state education agencies, and nonprofits to sponsor more than 300 SDP Fellows. Fellows may already work at a partner agency, or SDP recruits and selects Fellows who are then placed at partner organizations. More than 300 SDP alumni work at K–12 agencies and organizations around the country, and most alumni continue to take advantage of the SDP professional network, trainings, and analytical resources.

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INTRODUCTION

"Analytics can save higher education. Really."

That was the provocative title of an August 2019 joint statement by the Association for Institutional Research (AIR), EDUCAUSE (the association of campus information technology professionals), and the National Association of College and University Business Officers. The statement was meant to inspire a sense of urgency and provide direction for higher education leaders to harness data as a strategic asset for organizational change. It presented a straightforward rationale for investing in data analytics:

> We strongly believe that using data to better understand our students and our own operations paves the way to developing new, innovative approaches for improved student recruiting, better student outcomes, greater institutional efficiency and cost-containment, and much more.[1]

Like many other sectors of the American economy, higher education is working to realize the potential of sophisticated data analytics to inform and transform how it operates. Progress has been uneven, though, with some state higher education agencies, university and college systems, and individual institutions leading the way while many others struggle to adapt. Why?

The Strategic Data Project (SDP) at the Center for Education Policy Research at Harvard University has a 10-year track record of developing data capacity in state and local PreK–12 agencies and organizations. For the current project, the SDP team interviewed 40 leaders and analysts at 29 institutions of higher education and postsecondary organizations. Our aim was to explore their data needs and to understand why some colleges and university systems have excelled in using data while others have yet to fully realize its potential to inform strategic decisions that will foster student success in school and the workforce.

The missing link, we discovered, is not in the technical infrastructure but in human capacity. If higher education is to take advantage of data analytics to improve student outcomes and increase organizational effectiveness, it will have to find better ways to attract, train, and retain strategic-data professionals who can inform policy and practice.

We are not the first to find this gap. A 2012 report from EDUCAUSE and AIR confirms that the most important—and first—investment an organization should make is in the expertise and capacity of its staff:

> Many institutions view analytics as an expensive endeavor rather than as an investment. Much of the concern around affordability centers on the perceived need for expensive tools or data collection methods. What is needed most, however, is investment in analytics professionals who can contribute to the entire process, from defining the key questions to developing data models to designing and delivering alerts, dashboards, recommendations, and reports.[2]

EDUCAUSE and AIR recommend that institutions deploy staff to develop a clear understanding of the institution's data needs before making any investments in software or other data infrastructure. Without such an understanding, institutions may waste time and money on tools that do not align with their needs.

However, attracting and retaining staff with the necessary skills has been increasingly challenging as interest in data analytics continues to grow across many sectors of the American economy. In March 2019, the jobs site Indeed listed "data scientist" as one of its top 25 in-demand occupations for 2019, with a 78 percent increase in position postings from 2015 to 2018 and an average base salary in excess of $133,000.[3] Reports of data-staff salaries in higher education, however, are considerably lower. According to the *Chronicle of Higher Education*, the national average salary for institutional researchers at two-year public institutions is $59,344. At four-year public institutions, including highly selective universities, research staff make an average of $68,000. According to Higher Ed Jobs, the average institutional research analyst makes $60,028 and deputy heads of institutional research make $77,646.

Considering these differences in earnings, it is difficult for state higher education agencies and less well-resourced colleges, such as many community colleges and minority-serving institutions (MSIs),

to attract and retain qualified personnel in this competitive job market. Further, institutions located in more remote rural communities are at a particular disadvantage. One interviewee from a rural, minority-serving institution in the South explained these difficulties:

> There are two of us that are handling everything, and our hours are long. It's challenging because now we are moving in the right direction, but the skill sets are lacking. It's hard for . . . minority-serving institutions to find [individuals with] those skill sets. To keep talent, you're going to have to be competitive with pay. It is very hard.

Table 1. Summary of Interviews Conducted

Category*	Interviewees
SHEEO Agencies and System Offices	5
Four-year Universities	10
Community Colleges	8
Minority-Serving Institutions (MSIs)	11
Student-Success Initiatives, Associations, and Research Centers	8

**Several institutions fall into more than one category (for example, some community colleges are also MSIs).*

This paper describes what we have learned from candid discussions with postsecondary leaders such as this one, and makes recommendations for how we might improve the use of data analytics in higher education through its most important asset—people.

INVESTIGATION OF HIGHER EDUCATION DATA NEEDS

After a decade of supporting data and analysis in PreK–12 education, the leadership of the SDP launched an effort to understand the state of analytical capacity within the higher education community and assess where it needs to grow. The team sought to determine whether higher education could benefit from a program like SDP and, if so, how such a program should be structured to best meet the sector's needs.

With support from the U.S. Department of Education's Institute of Education Sciences, and in partnership with the State Higher Education Executive Officers Association (SHEEO), the SDP team conducted semi-structured interviews with 42 stakeholders in several key segments of American higher education about the need for enhanced analytical capacity in the sector (see Table 1). We interviewed SHEEO agency staff and representatives of four-year universities, community colleges, and MSIs. We also interviewed representatives from organizations that assist institutions with producing analyses and developing analytical capacity, including student-success initiatives, membership associations, and research centers. All interviewees were promised confidentiality, so findings, including any direct quotations, are presented without attribution.[4]

FINDINGS: ANALYTICAL CAPACITY AT HIGHER EDUCATION INSTITUTIONS AND AGENCIES

Previous Research

Traditionally, higher education agencies and institutions have primarily used data to generate descriptive statistics for compliance and accountability reporting. Today, the higher education sector faces an increasing need to use data strategically to better understand the student experience, to track institutional processes and outcomes, and to support decision-making at all levels—in short, to deploy data analysis in the service of institutional improvement. In recent years, several national organizations have documented the need to expand the analytical capacity of higher education:

- In a 2015 report, EDUCAUSE found that the primary motivations among its members for investing in data analytics were to improve student retention, strengthen students' course-level performance, and document the value of higher education.[5]
- In the same year, the National Association of System Heads conducted a detailed study of analytical capacity in public university systems and found that offices of

institutional research are "at best unevenly positioned to support change."[6]

- In 2017, AIR, EDUCAUSE, and the National Association of Student Personnel Administrators surveyed their membership to see how institutions were using data analytics to support student success. The resulting report recommended increased collaboration among institutional research, student affairs, and information technology to better understand and promote student success.[7]

Informed by this work, we intentionally chose interviewees from across the spectrum of analytical capacity. We hypothesized that institutions with fewer resources, like community colleges, would be struggling relative to better-off institutions. SDP found that institutions and agencies varied significantly in analytical capacity in 2019, with some having made substantial progress and others continuing to struggle.

INTERVIEW FINDINGS

Variations across Institutions

The interviews revealed how institutions vary in their use of data along several different dimensions:

- Types of analyses conducted
- Access to analytics across organizational units and by personnel level
- Integration across various types of data (student, personnel, financial, and so on.)

Types of Analyses Conducted

There is a wide range in analysis types, from producing mandatory reports to using data for decision-making at all levels of the organization. In some underresourced institutions, sociology or statistics professors volunteer in their spare time to conduct data analyses for compliance reporting. One interviewee shared:

> This is a low-resource institution issue. They don't have an institutional research (IR) office, they have a faculty member in the math department that just so happens to be good with numbers, who provides reports here and there for the board and for the president.

At the other end of the spectrum, some institutions are able to use artificial intelligence to construct risk models that identify students most likely to drop out after the first term and to select interventions most likely to keep them enrolled and on track.

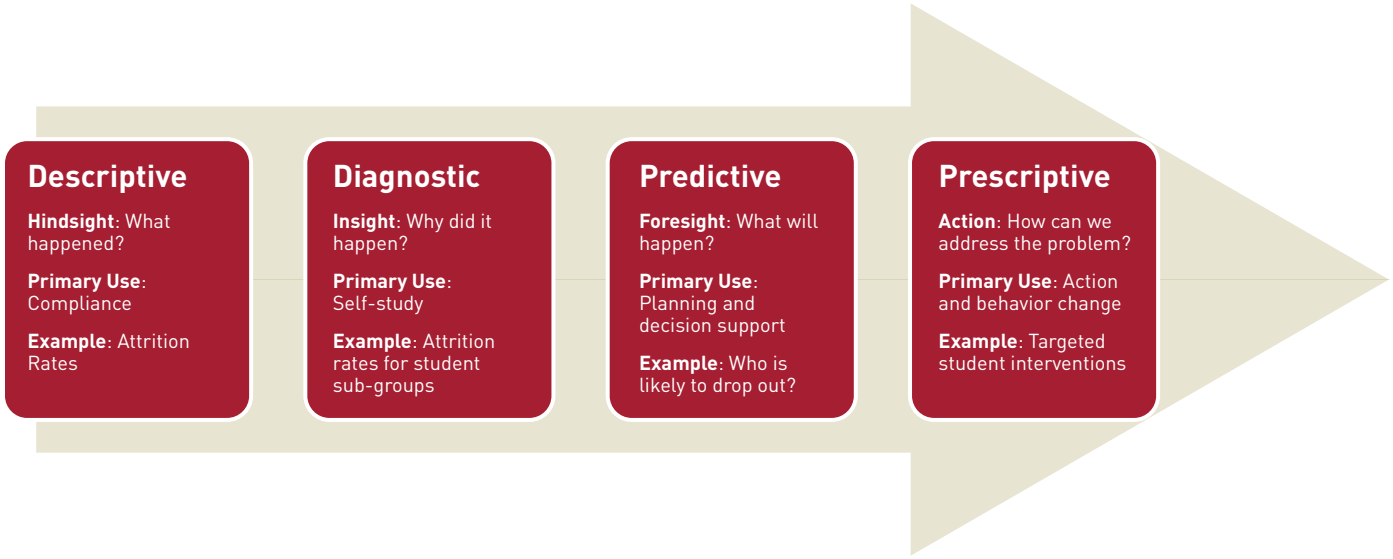
> We know a lot about our students, and we can actually develop a model that gives us an idea of the risk of student departure at the end of the first term.... We can now push out information to the students automatically if we think they are at risk. For example, if your GPA drops or if you fail a course in the first term, you are very much at risk of not graduating and you are much more likely to drop out. Now, we can notify students right away. We can look at midterm grades. We can look at other predictors and say that you should go talk to your advisor right away. This is all artificial intelligence work, and this is an area that we have been thinking through.

Indeed, institutions of all kinds vary in their capacity to do strategic analytic work.

The model in Figure 1 is based on one commonly used to describe the progression of sophistication in how organizations deploy data.[8] It represents a continuum from retrospective reporting to data models that trigger targeted interventions. We have added a fifth category, "evaluative," in response to the need expressed by many interviewees for measuring the effectiveness of interventions for scale.

To demonstrate how this model applies to higher education, we will use a sphere of university operations that has historically made more use of strategic data analytics than many others have—the admissions office. At the least sophisticated end of the spectrum, *descriptive analysis* might consist of a report at the end of the admissions cycle on how many students enrolled, and their characteristics. A *diagnostic analysis* would look at the yield rate (the percentage of admitted students who ultimately enrolled) for students with various characteristics. This kind of analysis can help identify factors correlated with students' choosing to enroll (for example, size of financial aid award, competing institutions, academic and demographic profile of candidates). A *predictive*

Figure 1. Progression of Analytics in Higher Education



analysis would construct a data model based on past student behavior that predicts the enrollment decisions of future students based on selected characteristics. Finally, a *prescriptive analysis* would use that model to determine actions the institutions could take to influence student behavior (for example, increasing financial aid awards, using more personalized communications). A similar example can be made with student attrition, as seen in Figure 1.

Most organizations that we interviewed are in the diagnostic or predictive phases of this progression, and all leaders indicated that they would like to improve their analytic capacity. One interviewee explained:

> We haven't yet initiated a fully systematic way of providing data in a way that is readily available. . . . What we have now is a lot of descriptive data about our students, about our workforce, but we don't yet have systematic analysis of the student life cycle, so we can describe how our students are doing. We can give you a profile of who our students are and how they are doing in their program, but we don't yet [know] what determines student progress and success.

Most expressed interest in getting more institutional support either to teach existing staff the needed skills for sophisticated analysis or to attract new talent to their organization.

ACCESS TO DATA ANALYTICS

Because colleges and universities are such complex and multi-faceted organizations, it should come as no surprise that the level of analytical sophistication and depth of data use can vary widely within an institution or SHEEO agency. For example, a university may have invested in sophisticated data models in departments that are responsible for meeting very specific and high-stakes targets (such as admissions and fundraising) but may have lagged in making similar investments in other areas of operation (for instance, student progress toward graduation or long-term outcomes for students). Likewise, stakeholders said that board members—who often come from the business world—may insist on having a sophisticated data dashboard to monitor the institution's operations, but faculty and front-line administrators may not have access to analytical tools and resources.

Figure 2 illustrates how access to, and use of, data analytics can vary across an institution and by personnel type. Even the most sophisticated institutions reported that they were still in the process of making data analytics accessible across the campus and to staff at all levels. Even if the tools are available, institutions and agencies continue to work on training staff to use them effectively and on establishing a culture across the organization that values the use of data.

Integration across Data Sources

Our interviews also revealed that institutions vary in how thoroughly they have integrated data across functional areas. For example, are data on student progression married to financial data to produce cost-benefit analyses of various student-success interventions? We found that discrete data—from discrete sources—are often displayed side-by-side in a dashboard for the board or senior administrators. What happens less frequently is the integration of data into the same analysis, thereby limiting institutional capacity to improve efficiency and effectiveness.

COMMON THEMES

While institutions clearly differ along the three dimensions discussed above, several consistent themes arose in our interviews regarding staffing needs and analytical priorities.

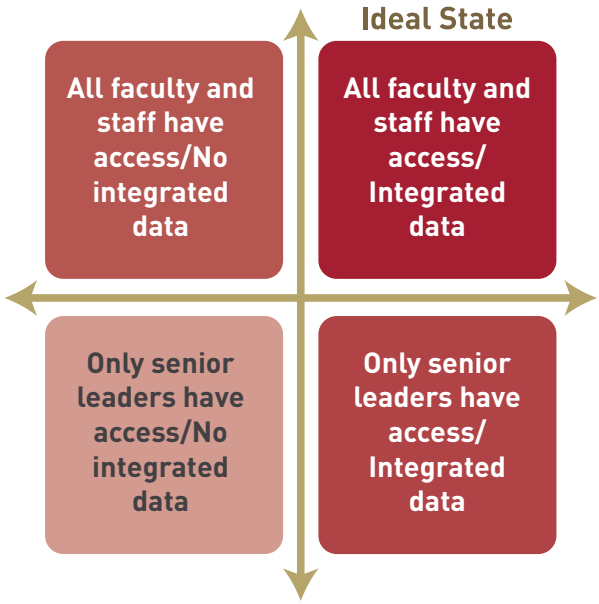
Staffing Needs

Most interviewees said it is challenging to attract and retain qualified staff. Though agencies and institutions outside of large metro areas experience the greatest difficulty, nearly all interviewees, regardless of location, have a tough time competing with employers who can offer higher pay for data analysts.

> The challenge is that [institutions] don't have the resources to get highly skilled people to their campus, and if they do, they get poached quickly. Occasionally, they will get strong talent, but they are only there for [a short period of time].

As a result, many agencies and institutions turn to external consultants to meet at least some of their research and analysis needs. Interviewees reported that this reliance on consultants limits their ability to fully understand the value they can derive from their data. They also said that consultants often apply a one-size-fits-all analytic framework, and that having stronger in-house capabilities would result in more customized and helpful analyses. Finally, outsourcing analytic projects isn't likely to change the organizational culture related to data use. "The relationship is often 'we can fill a hole you have,'

Figure 2. Data Integration and Access Matrix



rather than, 'we can help you build a mountain,'" one person said. Interviewees want mountain-builders.

Additionally, many interviewees from institutions that do have internal talent reported that while many of their staff have the technical skills for descriptive data work (for example, cleaning and reporting), they lack necessary communication and leadership skills, including the ability to:

- listen carefully to stakeholder needs and, from that, craft system- or institution-specific studies that provide valuable insights into the questions that stakeholders are grappling with. "Technical people [need to be] leaders," one interviewee said, "rather than coming to the leaders with raw data and asking what questions they have and what they'd like to learn."
- describe findings to nontechnical audiences, verbally, visually, and in writing, in a clear and compelling fashion. One interviewee said that a recent report on college completion ran to 100 pages, much too long to provide actionable takeaways for readers. "[We need] someone who can be a bridge between administrators and decision-makers and IT people."
- explain and generate excitement about using data with multiple audiences, such as senior leadership and faculty, in order to better serve

students and meet other organizational priorities. "You can bring data to people, but it's hard to get people to use it or know how to talk about it." One interviewee described an "Own Your Data" campaign that encouraged institution-wide adoption and use of data to improve postsecondary completion.

- work collaboratively across a variety of areas and departments to break down silos and integrate data to answer key questions. One interviewee described the need to integrate financial data into other common reports about enrollment and retention so that better cross-campus comparisons and decisions can be made by system-level leaders.

These "soft skills" enable analytics staff to translate findings for key stakeholders (from leaders to families), who are then more likely to use that data for strategic decision-making.

Analytical Priorities

Interviewees were nearly unanimous in identifying these three analytical priorities:

Student Success. As described in the 2015 EDUCAUSE report, higher education leaders want better ways to understand factors affecting student success. The most data-savvy agencies and institutions can track course-level student performance and attendance and can flag students if they start to veer off track. However, most respondents are not yet able to identify struggling students or to evaluate the efficacy of their various student-success initiatives.

Workforce Connections. Agencies and institutions of higher education (IHEs) also seek to track students after graduation and into the workforce. Higher education leaders want to collect and analyze data on graduates' workforce experience to better understand needs in the labor market, evaluate the economic return on their various programs, and bolster their case for the value of a degree. Because there are few models for this type of research and many of the data sets on worker experiences and characteristics are new and unfamiliar, IHEs could benefit from training in the use (and misuse) of these datasets and in creating reusable analytic frameworks that provide helpful insights.

Equity. Finally, there was strong interest in using data analyses to improve equity of outcomes and to close gaps. To do so, agencies and institutions must be able to make decisions about strategies with the many aspects of student identity and life circumstances in mind (for example, students who are also parents or are living on food stamps).

As one would expect, within these areas of consensus, there were differences by agency and institution type and among institutions of the same type.

Student Success. Many institutions want to understand what works in improving student outcomes and to marry that information with data on expenditures in order to understand the costs and benefits of various interventions and initiatives. In contrast, some more-sophisticated institutions already know what works for them and are now focused on encouraging all units to adopt proven practices and to use data to inform and monitor their success. Some institutions (particularly community colleges) expressed interest in better understanding the college readiness of students at local high schools so the colleges could more effectively serve those students when they enroll. Finally, there was a subgroup of institutions interested in better understanding student learning within and across courses.

Workforce Connections. Everyone interviewed is interested in workforce connections, but sometimes for different reasons. SHEEO agencies want to understand current and future needs for the state's workforce in order to inform statewide higher education policy and investments. SHEEO agencies use information about employment outcomes to inform program approval and review, to inform partnerships with workforce development agencies, and to develop consumer-information resources. In addition, they are keenly interested in developing models that determine the relative value and return on investment of different types of credentials. Colleges and universities want this information too, but for much more localized reasons. They want to be able to track their graduates into the workforce to assess the value of their programs, to help guide students' decisions about courses of study, and to improve marketing, alumni relations, and fundraising efforts.

Equity. *All* interviewed agencies and institutions see the importance of using data analysis to address persistent gaps in student outcomes along racial and socioeconomic lines. This priority is particularly pertinent to the mission of MSIs, because of their histories of addressing educational equity. However, because MSIs may have demographically homogeneous student bodies, standard disaggregation practices are not sufficient to address equity. Nuanced tools and measures are needed.

Additional Needs by Agency/ Institution Type

In addition to the three consensus areas, agencies and institutions expressed a range of additional needs that varied according to organizational mission and resources.

In general, state higher education agencies seek to more rapidly shift their primary focus from mandatory reporting requirements to more-sophisticated analyses that identify interventions that can improve student success and address educational equity concerns. For example, one state-level interviewee shared a need to understand the connections between financial decisions and student success, asking, "What's the choice architecture for how people decide whether or not to borrow and how much? What percent of the amount you're eligible to borrow do you actually borrow?" Interviewees emphasized that, in order to effect change, data analyses must be structured and communicated to enable a broad range of decision-makers to develop and implement data-informed strategies. Some state agencies noted that they need to better understand and use their states' longitudinal student-data systems.

Traditionally under-resourced four-year institutions and community colleges also face challenges in strategic-data use, though there is significant variation among these institutions. One community college administrator described the importance of data as the "first hurdle to move the needle on student success," and under-resourced institutions recognize that having staff with the right knowledge and skills is a necessary precondition to using data effectively, especially after outside contractors produce reports. Though many institutions struggle to attract and retain staff, less-resourced colleges have the most difficulty, often because ready talent is scarce in their region and because they cannot compete with higher-paying employers elsewhere. On the other hand, better-resourced colleges often have staff members who have the requisite technical skills, but who lack leadership and communication skills or an understanding of the higher education world.

Community colleges have unique needs for strategic data analysis because they serve a highly diverse student body in programs that range from adult basic education to highly competitive technical programs. Community colleges also are tied to the K–12 sector in a more intimate way than most other colleges, because they host significant numbers of high school students in dual-enrollment classes. As a result, they need analyses that span both sectors.

Many interviewees expressed a desire to collaborate on research questions with local K–12 partners. Given the mission of community colleges to serve the local community, and their focus on career programs, these institutions have a keen interest in understanding the local labor market, both to gauge the community's needs and to determine how their graduates are faring.

Finally, MSIs are extremely diverse in resources and capacity, ranging from large research universities to small, geographically isolated public and private colleges. Though some MSIs have only basic data infrastructure (and still do some of their work on paper), most collect data effectively and convert it into descriptive reports. Many MSIs have limited resources and thus have difficulty in attracting talent. Like many other institutions, they also struggle to create an institutional culture in which data access and analysis play a prominent role. One interviewee suggested that her college must "crawl before we walk."

CORONAVIRUS AND FUTURE CONSIDERATIONS

After the onset of the coronavirus pandemic, the research team returned to four interviewees to learn more about how the pandemic might shift their strategic questions, data collection, and analysis efforts. According to those interviewed, the COVID-19 crisis didn't obviate the need to focus on student success, it put more urgency around questions about how to improve student success and workforce outcomes. Yet institutions, especially community colleges, face a new set of questions they must answer in order to support students in attaining postsecondary success, from community college transfer to four-year institutions to graduation to the workforce.

Institutions are asking an array of new questions (not all of which have data available to answer them):

- How do we measure student risk aversion? Will moving instruction online cause students to switch majors or change their course-taking patterns?
- If institutions move more content online for the foreseeable future, which seems likely among interviewed institutions, how will that affect facilities and operations?
- Are course success rates the same as before? How do we measure student engagement online—at scale?
- How do we adjust our early warning indicators, given these new instructional and economic realities?
- How effective is professional development for faculty transitioning to online instruction?
- How effective are counseling and other noninstructional supports for students in a virtual ecosystem? What do institutions need to know to support students online?
- What technology is needed to reach all students, and how can we leverage that technology to keep students, particularly students who do not typically thrive online, on track?

While many selective and mid-tier institutions are concerned about enrollment, interviewees at two-year institutions and less-selective four-years are facing a different set of challenges. After seeing a significant increase in online summer course-taking, one interviewee said that her institution was "examining the successes over summer and leveraging that information to...keep [students] moving into the fall." Reflecting on dramatic increases in summer enrollment, another interviewee asked how to measure, "the point at which we max out our capacity to serve."

Uncertainty about the economy is disrupting the use of old predictive models. One interviewee shared, "Unemployment tends to influence our enrollment patterns, especially at community colleges, but this may be...different than the recession in 2008....We don't have the ability to verify...that trends are going to play out in the same way they did in previous cycles.... [That] makes it very difficult to use our previous models and projections."

States and institutions are also grappling with a changing economy and the role that postsecondary institutions will play in supporting student success—in school and in the workforce. One interviewee shared, "When COVID first hit, we quickly deployed a survey on what our students might need. We wanted to make the promise that our students would always have access to food and technology. When students returned to remote learning, they had what they needed, and we set up an infrastructure to make sure that students got . . . computers and Internet [connections]." Institutions find they need to identify students with changing circumstances in order to provide them with emergency aid and financial resources.

Another concern was expressed around measuring credentials and their value. One community college that prides itself on its partnerships with local businesses and high job-placement rates said that opportunities for employment are retracting and the data about available opportunities are less reliable. Institutions need strategic support to think about how to collect new workforce projections and use them to offer promising pathways. "We don't want students saddled with debt because they thought there were jobs at the end of their credentialing program. We need to provide a realistic picture to current and future students."

Finally, data leaders are concerned about the future of data culture in their organizations. "We used to give more time to collect[ing] buy-in from the community. We are moving at a clip, and people feel data are being used to support a preconceived notion, not an exploration." For example, data leaders need buy-in from faculty and counselors to reach students in need of support. One asked, "How do we get faculty, once used to delivering instruction in person, to deliver online and record grades early in the semester so that we can predict course dropout and failure?" Institutions expressed a need for a strong data culture so that they can fulfill the promise of evidence-informed strategic decision-making in times of crisis.

CONCLUSION

In accord with several recent national studies, we found that higher education state agencies, university systems, and individual institutions vary significantly in their capacity to use data to support student success. Interviewees also expressed consistent interest in developing staff capacity in order to make effective use of data to support decision-making, particularly in the areas of student success, connections to the workforce, and educational equity. Interviewees emphasized that, while technical expertise is important, leadership and communication skills are the most difficult to find and develop in analytics staff. As institutions transition from producing simple analyses in a dedicated research office to encouraging the investigation and use of data across the organization, the skills required in institutional research offices and analytics staff have expanded and changed. Data and evidence hold powerful potential for transforming decision-making in higher education. Strategic-data professionals who are strong leaders can drive the needed change in organizational culture that will allow the community to fully harness that power. ■

ENDNOTES

1 See **https://changewithanalytics.com/statement/**.

2 Bichsel, J. *Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations* (Research Report). Louisville, CO: EDUCAUSE Center for Applied Research, August 2012, p. 3. Retrieved from **http://www.educause.edu/ecar**

3 See **http://blog.indeed.com/2019/03/14/best- jobs-2019/**.

4 See Appendix for the interview protocol.

5 Yanosky, R. with Arroway, P. *The Analytics Landscape in Higher Education, 2015*. Louisville, CO: ECAR, October 2015. Retrieved from **https://library.educause.edu/-/media/files/library/2015/5/ers1504cl.pdf**

6 Gagliardi, J. and Wellman, J. *Meeting Demands for Improvements in Public System Institutional Research*. Washington, D.C.: National Association of System Heads, February 2015, p. 4. Retrieved from **http://nashonline.org/wp-content/uploads/2017/08/Assessing-and-Improving-the-IR-Function-in-Public-University-Systems.pdf**

7 Parnell, A.; Jones, D.; Wesaw, A. and Brooks, D. C. *Institutions' Use of Data and Analytics for Student Success: Results from a National Landscape Analysis*. Washington, D.C.: National Association of Student Personnel Administrators, Association for Institutional Research, and EDUCAUSE, 2018. Retrieved from **https://www.naspa.org/images/uploads/main/DATA2018_DOWNLOAD.pdf**

8 Adapted from chart created by Gartner, Inc. See **https://www.zdnet.com/article/data-to-analytics-to-ai-from-descriptive-to-predictive-analytics/**.

APPENDIX: INTERVIEW PROTOCOL

Note: Interviews were semi-structured, so each interview subject was asked a subset of the questions that follow.

Context

- How important are data analysis and targeted research to inform policymaking and accountability to your organization? Do you conduct analysis primarily to meet reporting requirements or are data used to inform decision-making? Can you provide an example of how analysis informs decision-making at your institution/agency?
- What topics have you studied in the last year, and what is on your docket for 2019–20?
- What types of institutional data do you regularly collect, analyze, and report on? What types of data would you like to collect and analyze that you do not now? What are the obstacles to accessing the data you seek?
- Does your state have an active longitudinal data system? Which agencies contribute data? What is your organization's role in managing that system? How do you use it? Are there challenges in using your state's LDS?
- What is the scope of your data collection and analysis activities? How many institutions and/or students do you track?
- Do you collect unit record data or do institutions only provide aggregate records?
- What national data systems and/or studies do you contribute to and/or use for analysis (e.g., National Student Clearinghouse, IPEDS, etc.)?
- Do concerns about student data privacy or security impact your organization's ability to do needed analysis? If so, how does your organization handle these challenges?
- Are you able to access data from other agencies (specifically, K–12 and workforce)? If not, what are the barriers?
- How important is ease of understanding and using data for your organization and/or its constituents? Who are the primary clients? Are the data used primarily by trained analysts or by lay people who aren't well versed in managing complex data sets?

Staffing

- What is your current staffing for data collection, analysis, reporting, and research?
- Would you say that you currently are staffed to do 1) the minimum reporting that is required; 2) required reporting plus high-priority additional analyses; or 3) a comprehensive program of data collection, strategic analysis, and policy research?
- Are you constrained in meeting your goals for providing better information for policy makers and system leaders because you lack sufficient staff capacity? Is this primarily due to funding limitations or because you can't find and/or retain staff with the requisite skills?
- Do staffing constraints limit your ability to take full advantage of your longitudinal data system? If so, what kind of staffing do you need (e.g., technical/programmers, data analysts, others)?
- What work would you like to do that you cannot perform due to capacity constraints?
- What skills are your staff typically lacking when they come in? What skills are relatively easy for you to find?

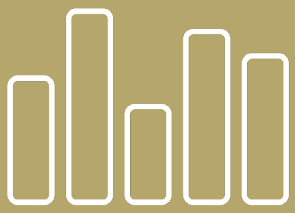
- Assuming that you can't always find candidates with every skill on your wish list, which are the most important: 1) technical skills (understanding of statistics and research methods, familiarity with statistical software packages, facility at manipulating large and complex data sets, etc.); 2) general understanding of higher education; 3) specialized understanding of an area within higher education (e.g., financial aid, institutional finances, student success); 4) oral and written communication skills; 5) IT/programming skills; or 6) something else?
- If you find it difficult to find and/or retain staff with the skills you need, what do you see as the primary problem? Are there just not enough people who have the expertise you seek? Do you lose qualified candidates to other employers who can offer more attractive positions or competitive salaries? If so, what type of organizations are your primary competitors for talent?

Strategic Data Project

- Based on what we've shared about how the Strategic Data Project works with K–12 state and district agencies and nonprofit organizations, do you think a similar fellowship program and professional network focused on issues in higher education would be an attractive option for your agency/organization?
- Do you have employees who you might want to nominate for a fellowship? Would you be interested in hosting a new fellow?
- What kind of professional development do you offer to your analytical staff?
- Would you be interested in partnering with your state K–12 agencies to each send a fellow that would work on projects collaboratively that are of interest to both sectors?
- Based on everything we've discussed, what do you see as the most essential knowledge or skills that a fellowship program for higher education analysts should help its fellows to acquire? If you were designing the curriculum, what would you make sure is included?
- What else do you think we should know that we haven't asked you about?

COVID-19 Supplement Interview Protocol

- What are the most pressing challenges that your institution is currently facing as a result of COVID-19?
- To what extent is the university using data to drive its response to corona-related challenges (e.g., drops in enrollment predictions)?
- What new questions will you need to answer with data? New analytic priorities?
- Do you plan on using any national data systems or studies? From your perspective, are there any particular national or state-level datasets that might be useful?
- Is your institution currently under a hiring freeze? Do you need data capacity?
- What else do you think we should know that we have not asked you about?



STRATEGIC DATA PROJECT

Harvard's Strategic Data Project works with education agencies to find and train data leaders to uncover trends, measure solutions, and effectively communicate evidence to stakeholders. Our inspiring network of system leaders, fellows, and faculty come together to share how to best use data to make a difference in the lives of students.

Learn more at **sdp.cepr.harvard.edu**.

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