



# Envisioning How Data-Informed Colleges and Universities Will Redefine the Student Experience

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# Introduction

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The Anthology Education and Research Center has engaged with four leading higher education data practitioners who work daily to support their institutions and their students. They represent different roles and work in a varied set of institutional types. Their extensive experience provides them with unique perspectives on how data can be used across the many dimensions of a modern university.

The initial premise for this white paper is a simple question: What does a campus look like when all of its data systems/silos are connected, clean, canonicalized, and available for machine learning algorithms, forecasts, dashboards, and alerts? Which insights are available? What are the methods faculty and staff use to accomplish their tasks? How does the student experience look compared to today?

One of the key concepts that emerged is moving from building a data-driven institution to that of a data-informed institution. In the recent book *Big Data on Campus*, (Webber, Zhang), this difference is made explicit in terms of how analytics must interface with and inform human-centered decision making.

**“Data Informed Decision Making is the process of organizing data resources, conducting data analysis, and developing data insights to provide the contexts and evidence base for formulating organizational decisions.” (p.8)**

Colleges and universities are complicated organizations with different people, processes, and outcomes. Using different lenses, the paper explores both the positive impact and cautionary notes of moving toward a data-informed institution. The four areas of focus are:

- Teaching and learning
- Administrative
- Diversity, equity, and inclusion (DEI, student belonging, and well-being)
- Accessibility

In the sections that follow, our experts will examine the focus areas for trends, predictions, and pain points and will offer a path forward for institutions looking to optimize their data experience.

# Teaching and learning

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The current outlook for the economic, demographic, and labor market will likely cause academic institutions to make difficult decisions, and some may even be forced to consider closing. Mature organizations will move from data-driven decision making to a data-informed culture. Specific topics will require collecting and analyzing data, on topics such as: What is Hyflex to our academic community? How can we define student success holistically? What academic experiences will help to attract, retain, and engage the majority of students and talented faculty?

The complexity of modern academic problems requires new approaches to institutional research. Perhaps less focus on data-driven decisions, which tend to be based on quantitative results, and more focus on holistic qualitative research that takes the student experience into consideration, would be more effective. Data visualizations and persona perspectives help in analyzing developing phenomena on campus before clear questions can be asked. Making visualizations available with current data helps to promote case study research and exploratory research. This approach is required to better understand the role of data gaps and the results of implicit bias. This may be a transition between data-driven and data-informed academic culture.

Data democratization may be one of the most beneficial movements in modern technology. Traditionally, data was restricted to administrators and highly divided into department silos. Data should not be an exclusive privilege, but a resource that can be shared, validated, and managed with appropriate transparency. Access to data and data education are therefore crucial, as are improving stakeholders' ability to use it. Data democratization includes improving data literacy into fluency, building data governance structures to improve access to data and related tools for all organization members, and encouraging data science adoption for individual instructors and students.



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Educational institutions can create a data-informed culture and encourage data democratization by:

- Sharing tools
- Sharing skills
- Sharing responsibility

Data analytics has done relatively little so far for the student user experience. Few projects provide dashboards to students or the ability to download academic data for citizen-scientist efforts. While some projects exist, such as University of Michigan MyLA or University of Illinois Chicago Course Resources Dashboard, these are few in comparison to dashboards for administrators or instructors. The US government modeled a healthcare approach of the Blue Button, where individuals can download their own data for verification, self-study, and sharing. Some efforts in academic technology have been undertaken to standardize learning analytics data through Common Data Model, Caliper Analytics, or Developer Data Dictionary. However, the cultural permission by academic leadership for students to receive their own data will require influence of the data democratization movement.

We have now advanced beyond digital literacy to data fluency as a goal. In **Educause Review**, Jennifer Sparrow explains the difference between digital literacy and data fluency as follows: “In learning a foreign language, a literate person can read, speak, and listen for understanding in the new language. A fluent person can create something in the language: a story, a poem, a play, or a conversation. Similarly, digital literacy is an understanding of how to use the tools; digital fluency is the ability to create something new with those tools.”

In an academic environment, students should be able to participate in the governance of their own data. Data lifecycles should be documented in institutional policies that are transparent and understandable to stakeholders. It is the right of students to know what academic data is being collected and how it will be used. Such data would be best verified by students, similar to self-service access to credit reports. By allowing students to verify their own data, organizations are able to identify data gaps or inaccuracies effectively.

Students may have the expectation that they will start their academic studies with a “clean slate” without being labeled as an “at-risk” student. While some may argue that labeling students allows educators to ensure they are meeting individual student needs, one can also argue that this at-risk assumption may diminish self-confidence and discourage students from trying their best. As accountable adults, college higher education students should be in charge of the decision of whether they want their own data reset or ignored; similar to the concept of search engine “right to be forgotten”.

In the student experience, past instructional technologies often centered around the LMS. However, as academic tools for specific fields of study mature, LTI integrations with their niche features and solutions often are adopted by individual instructors or departments, not entire organizations. Such tools often take advantage of cutting-edge technology such as advanced grading techniques, field-specific plagiarism such as programming, AI in discussion forums to build and evaluate the depth of expression, or behavioral AI chatbots that accommodate emotional intelligence to build belonging and affect. These LMS plugins deliver value to instructors, making their academic work more productive, while students receive more detailed and timely

feedback. Data analysis that is focused on LTI tool usage, surveying student and faculty experiences, and sharing findings to promote the best instructional solutions, will support positive academic experiences.

Organizations that successfully adopted instructional technology prior to the pandemic were able to track, through data analytics, instructor and student progress. For some organizations, the period of forced remote teaching was like flying in the dark without instruments. While some academic fields and academic communities integrate online learning more easily than others, digital learning improves the resilience of instructors and promotes flexibility in student learning. This in turn lends itself to remediation activities, as some students can be presented with activities and content to bridge the knowledge gap while others can be presented with optional advanced material. As such greater adoption of instructional technology can lead to greater resilience of students and faculty to unexpected circumstances. It can also lead to faculty personal and professional development by increasing work-life balance along with the support of non-tenured faculty to use learning analytics in support of paths to promotion or participation in self-governance.

Data analytics continues to be affected by large quantities of data and systems that need to be processed with the help of ML and AI. Introduction to open source and online availability of graphical AI systems such as DALL-E, Stability AI, DreamStudio, and Midjourney open a new chapter in leveraging AI. These systems allow an artistic transformation of text into images. A 2022 Colorado State Fair's fine art competition was won by an AI-generated piece. This may change how institutions approach art education in the future. Even though new art technologies traditionally do not completely replace previous techniques, they do push them into alternative roles. An example of this type of role shift was how photography pioneered a new understanding of art in the 19<sup>th</sup> century. Since photography could depict the world more accurately than painting, painters transitioned from naturalism and began to focus on portraying emotions and impressions. While the role of painting shifted to make way for photography, both mediums continue to influence each other as means of visual representation.

This AI innovation, as well as previous AI-driven text re-writes, continue to raise concerns of academic integrity because of their ability to create original looking essays. The AI is trained on copyright creative work without clear permission, which calls into question academic integrity when such work is turned in for grading. Increasingly realistic fabrications will continue to affect academic life. This also creates concerns for the job market in graphic design and illustration. Arthur C. Clarke's statement is more current than ever, where he wrote, "Any sufficiently advanced technology is indistinguishable from magic."

Finally, while the text-to-image AI opens many doors, the opposite direction of image-to-text AI allows automatic auditory image descriptions to ensure accessibility for visually impaired students. While web accessibility requires that a brief description be added to images that carry meaning, decorative images often are exempted. Further, the short descriptions, often less than 100 characters, do not equitably carry the impact and meaning of the pictures. Therefore, image-to-text technology has the potential to positively impact adaptive technology and their users. Of course, just as auto-generated captions for video do not fulfill compliance requirements, auto-generated text descriptions for images that carry meaning require human review to meet compliance requirements.

While teaching and learning are the “beating heart” of any institution of higher education, increased insights via data analytics will have impacts on other facets of these organizations. Administrative functions are the next area to be examined.

## Administrative

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### **It all starts with asking the right questions**

Asking the right questions and considering the strengths, weaknesses, opportunities, and threats facing an organization is important for guiding the collection and interpretation of data. That is, linking data analytics to institutional strategy is key. There is an important distinction between data analytics as they are used for strategic decision making at the organizational level and data analytics as they are used tactically. A specific example is student success analytics.

In both cases, thinking about asking the right questions is very important. The difference is the degree to which the analytics have to be accessible and actionable.

Strategic analytics often provide information about the past, present, and likely future environment. Many institutions have little control of the environment they operate within. In the language of economics, they operate in relatively competitive environments. For example, a single institution that serves a regional population might use strategic analytics to forecast the number of prospective new first-year students (e.g., 18-year olds) in their market area, but has little ability to influence that number. In this case, the information is important, but the degree to which it is actionable is limited. This is even more true if you replace actionable with “actionable within a short time frame”.

Tactical analytics are most useful when there is either a higher degree of actionability or when it is actionable within a shorter time frame. A prime example of this is the use of student success analytics. Student success analytics are the use of data-informed practices that leverage student information to influence decisions regarding student experiences and outcomes. Information that is not actionable within a relatively short time frame may not be useful as it does not allow enough time for students or faculty to plan strategically. In some contexts, immediate actionability is key. An example from another part of this document is the University of Phoenix Disability Services. Because their semesters are only five weeks long, typical accommodations for declared disabilities may take longer to implement, which impacts their effectiveness.

### **Even with the right question, the answer may still be no**

The major challenge for higher education institutions and private businesses is determining whether decision makers will act on findings. Unfortunately, the answer is too often no.

But why is this so? And how do we overcome opposition to action? Redirecting an institution to make greater use of new data, fresh analytical techniques, systems, and the latest business processes is fraught with risks for leadership.

People frequently do not trust the new data, especially if it contradicts their prior experience. This is an example of confirmation bias. How many of us have sat in meetings where informal data validation becomes the primary focus and the larger picture is lost?

In particular, when new techniques fall outside of their areas of expertise, people frequently lack confidence in them. It doesn't help when we refer to standard analytical tools and algorithms as "black boxes" and the effective application of these techniques as "the secret sauce". We can help ourselves by mentioning how these methods (not algorithms!) are commonly used by businesses and their customers successfully. How many of us have bought something that other customers are interested in when prompted by an internet retailer on our way to our shopping cart?

People are resistant to changes in their business processes. This stems from two or more factors. First, the people in key positions of operational responsibility are likely to have been successful in that role and the roles leading up to it. As a result, they are hesitant to "mess with what works". Moreover, many institutions do not have metrics or accountability mechanisms that would encourage changing to adapt to new processes, systems, or technologies. Put another way, it's often difficult for us to demonstrate the need for change at the level of an individual's role within the organization. Given the more persuasive (rather than command) systems of university management and leadership, it's difficult to enforce change even when we think it's to the organization's benefit. Second, as noted in the Harvard Business Review article, "**Why Is It So Hard to Become a Data-Driven Company**", we often describe data analytics as disruptive or transformative. Is it any wonder then that individuals within the organization might not have the ability to understand how to optimize business processes to take advantage of these "revolutionary" tools?

## **Getting to "yes": the role of incentives in change management**

It is often said that culture eats strategy for breakfast, but cultures are defined by incentives.

Chasing intellectual fads is not part of the design of higher education. Faculty, and many of the leaders whose path has taken them through the faculty, are often very deliberate as scholars and slow to change their views in fundamental ways. Although many might rail at the thought, higher education as an industry, and as individual institutions, is deeply conservative. Radical changes are few and far between and we are slow to change even in small ways. We have benefited by this conservatism. Higher education has historically been very successful in terms of generating economic mobility and as an engine of innovation and economic development.

At most institutions, many faculty face incentives that haven't changed very much in a long time. It's also quite true that staff incentives haven't changed very much in a long time, either. Don't believe it? Does your institution have a bursar? Does anyone know what that word even means?

There is limited accountability in higher education and very poor links to outcomes and performance. It's possible that only major league batters have higher acceptable failure rates. To change the culture in a way that encourages better use of data, we must change the incentives that form it.

*There are different opportunities to link data to incentives depending on the specific role of each campus persona*

## Campus personas

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### Faculty

Faculty spend fractional efforts on teaching. They are typically evaluated primarily on scholarship. This is an especially important point that leads to an equally important question that almost no one asks: is this (fractional efforts on teaching, emphasis on scholarship) a variable, or is it a constant? Many discussions of using data for student success assume the former, which is simply not true and leads to faculty, staff, and administrators talking past each other. Recognizing it as a constant (or perhaps a constraint) might result in more productive conversations because it provides faculty with an incentive to actively engage in the conversation.

Teaching faculty aren't always linked tightly to the institution (adjunct contracts typically are semester based). This mutes their incentives to make investments in the specific processes and systems used by a particular institution. It does not mute their incentives to make investments in general and transferable teaching skills and knowledge of their discipline.

The long-term replacement of semester-based adjuncts with longer-term lecturers provides better incentives for specific investments, and some institutions recognize that connecting non-tenure track faculty more closely with an institution can generate value for both the institution and the students. Lecturers also have more focused incentives on teaching and student success. It must be recognized, however, that tenure and tenured faculty provide significant and broad benefits as well, and institutions must pay attention to the mix of their instructional faculty.

A teaching faculty member (e.g., long-term lecturer) can provide additional benefits to the institution when he or she identifies and incorporates systems and practices into their classrooms that become widely adopted by the faculty as a result of their proven value.

### Administration

While higher education is conservative in its desire to change, for many units inside the institution that might use data effectively, there are muted incentives to adapt to new data, processes, and systems. There are at least two key metrics that provide information that can be used to create incentives to change and spark innovation:



## 1. Enrollment

Declining enrollment, either in the aggregate or at the divisional or departmental level, can create strong incentives for innovation and change. Large enough declines in enrollment can threaten survival. Historically, the age-based demographics of the population have shielded most institutions from declining enrollment. As the baby-boom and the baby-boom echo worked their ways through the population, institutions could frequently rely upon an excess demand for their seats.

## 2. Success

Only about half of students who start college finish it, leaving the remainder with unfinished degrees that have little labor market value and, in some cases, debt. Institutions and governing bodies have recently become far more concerned about low completion rates and have begun to hold themselves or the institutions they govern more accountable. Increasing student success has also become recognized as an excellent strategy to offset the declining number of prospective new freshmen.

## Finance and budget administrators

The budgetary system at many, perhaps most, universities might be best characterized as reinforcing the status quo, rather than providing positive incentives for change.

Many universities use a historical budgeting system. Broadly speaking, this means that budgetary units receive the same amount this year as they received last year, and a roughly proportional share of any incremental new financing. Moreover, activities that were funded in the past are seldom assessed for their effectiveness either in absolute terms or relative to other activities or prospective activities.

It is well understood that historical budgeting has distinct advantages, though. One advantage is that historical budgeting tends to limit tumult on campuses that might occur with large changes. It tends to reduce the tendency for institutions to chase fads in terms of organization, management, and academics.

Some organizations link budget allocations to enrollment at the divisional level. This type of allocation, operating under the general term of responsibility-centered management, creates what amounts to an internal market for students. Some portions of the tuition dollar flows (and state allocations tied to students) move with students as they change divisions or colleges. This provides incentives for divisions or colleges to change their behavior to attract and retain students.

Some of those changes are directed toward success or the student experience, and there are strong incentives then to use data and analytics to assess which elements of an institution's activities most enhance student success and their experience. Despite its effectiveness at attracting and retaining students, critics argue that budget reallocation often provides strong incentives to reduce rigor and standards, or to spend resources on things which have little connection to learning.

In a perfect world, markets can provide excellent incentives for change. Internally to an organization, an artificially created market for students can also encourage incentives for change, but it requires designing a system that ensures those incentives are effective. Tying budget allocations to appropriate metrics is a difficult challenge, but one that can typically be partially solved. Ideally, data and analytics should be used

to determine whether units are meeting key performance indicators and to ensure a single, well-understood version of the truth.



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This creates acceptance for the budgetary allocations dictated by the system and ensures that the various units are operating cohesively as an institution.

Performance-based funding (for public institutions) can sometimes marry the common historical budgeting system with some features of a Responsibility Centered Management (RCM) or similar market-based system. It is critical that the metrics are appropriate to the institutional mission and role to be effective.

In this system, institutions are either rewarded or punished for their performance relative to a set of key performance indicators (KPIs). These KPIs are designed to provide institutions with incentives to innovate in order to achieve the goals established by outside stakeholders or governing bodies. Some state governments have established a pool of enhanced funding for institutions that meet a certain set of objectives. This enhanced funding then functions as a carrot to provide positive incentives for change.

Interestingly, the prevalence of performance-based funding models has accelerated the use of data analytics at many institutions. But there are also incentives to design systems to use current and historical data to predict how institutions will perform relative to the benchmarks during the evaluation period (e.g., the academic year).

Leadership believes it is important to gather information proactively so that needed course corrections can be recognized and implemented. Driving an automobile effectively requires seeing the road ahead, not just the road behind. Leaders have traditionally leveraged descriptive statistics to understand where the road has taken them, and now we have the ability to anticipate where they are likely headed with enough time to make any needed course corrections.

The events of the past couple of years have focused attention on how our institutions care for their students, faculty, and staff. This work can be accelerated by leveraging data analytics.

# Diversity, equity, inclusion, and student well-being

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With a connected, clean, and available ecosystem that enables machine learning, predictions, dashboards, and alerts, several outcomes for inclusion, diversity, equity, and accessibility can be achieved. In order to streamline access to data, systems must communicate with each other and privacy policies must be followed, but humans are at the center of data integration work. The outcomes of complete and thorough data integration relies on the data fluency and cultural competence of the end user. People, process, policy, and systems are all critical to the successful implementation of complete data integration to advance inclusion, diversity, equity, and accessibility outcomes. The following paragraphs will explore these components in more detail.

## People

While data integration is a portion of the larger problem in higher education decision making, data application may be the larger challenge still. Leveraging data to advance equity in higher education was identified as one of the core challenges facing higher education assessment (Singer-Freeman & Robinson, 2020). A national strategic plan confronting this challenge focuses on initiating and promoting equitable assessment practices, investing in professional development to support equity and assessment practices at the individual level, and examining the role of existing structures such as national surveys and accreditation criterion to increase equity (Heiser, Milligan, & Montenegro, 2021). This plan suggests investments are needed at three levels: people, practices, and systems.

In a survey of 568 higher education professionals, 60% disaggregate data by population demographics, 58% use multiple sources of data to identify findings or draw conclusions, and 52% use multiple methods to measure student learning (Henning, Lundquist, Heiser, & Rice, 2022). The same study (Henning et al., 2022) found that less than 50% of respondents used data to identify barriers to equitable outcomes (49%) or used data to advocate for structural changes (45%).

Data fluency and cultural competence are inextricably linked and must be cultivated to create culturally affirming conclusions and holistic interventions for school communities. Integrated data systems can be leveraged to create these inclusive environments where each individual has what they need to be successful. With admissions data connected to academic and co-curricular data such as fitness, clubs, organizations, etc., each residence hall, college, and program can have a profile to help students build a more immediate sense of community and belonging. The university population can be better understood by faculty, advisors, residence life staff, and counselors in an aggregated sense as well as in a microcosm to determine how best to serve it. Student entry data such as CIRU would become immediately accessible to multiple campus resource offices to align and shape their efforts in the critical first six weeks of classes.

In an integrated model, base levels of information about students would increase, allowing us to cultivate trust and build relationships for student success more immediately. A single student's story is no longer what compels administrators to allocate resources, but the ability to contextualize a single student's story into the

larger socio-political context of student needs as a whole. Those who have great relationships with students often are not spending their time collecting data, so there is a disconnect between systems, structures, and individual student experiences. The same is true for faculty and staff. A racial incident between a tenure-track faculty member and new assistant professor may appear in isolation because this may be the first assistant professor to file a complaint. Reporting systems could shift to include third-party reporting in a centralized location where incidents are no longer isolated and trends are more readily identified. In this integrated model, data is accessible and used to create clear pathways for student success and student success portfolios for diverse members of the community to see themselves as successful and thriving in the post-secondary environment.



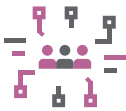
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In this model, chief information technology officers shift to become chief implementation and action officers with deep connections to institutional offices focused on diversity and inclusion. Data silos are replaced with coalitions of individuals leveraging the data to advance student success.

### Process and policy

In an integrated and easily accessible data system, administrators could readily identify individuals, policies, and processes that are biased, foster exclusion, oppress equity, and even cause harm. In their study, Heiser and Allbee (2020) examined 18 months of student conduct data by race and gender to find students identifying as African American males were more likely to be referred to the conduct process than any other racial group. The same group of students were not more likely to be found responsible in the conduct process but were being routed to the conduct process at a disproportionate rate. The same trends exist in detentions and expulsions at the K-12 level. Integrated data infrastructures would allow conduct data, academic advising data, academic integrity data, student grades, student engagement, and space usage data to live in the same place, allowing us to identify trends that are fostering disparities in educational outcomes.

On the local and national level, are advisors disproportionately routing Black and Brown students to take lower credits? Are conduct processes across the country replicating the larger socio-political structures we see playing out on the news with the police force and Black communities? Are national gender pay disparities replicated on college campus pay scales for student and professional employees? Is student engagement connected to student belonging? If so, who is and is not yet engaged in the campus environment and classroom?



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Integrated data systems could facilitate safer and more inclusive campus environments. Members of behavioral intervention teams would have a clearer sense of students who might be a risk to members of the campus community or themselves. Campus care teams could work proactively to strategize an action plan composed of evidence-based strategies to support struggling students. Real time data related to student behaviors (e.g., using a well-being app, class and social participation, conduct interactions, campus community concern forms) would allow care teams/behavioral intervention teams and student success coaches to identify significant shifts or patterns in student behaviors. Student concern forms, attendance records, conduct cases, police incidents, and other data can all be connected in an integrated system to generate notifications for students of concern. This data could even be linked to high school student records. Students could interact with course content remotely or on campus, based on their needs. If we have data on students who face challenges such as seasonal affective disorder/depression, we could reach out to them proactively with techniques to help them manage their depression outside of counseling.

## Systems

Truly integrated data systems in higher education would extend beyond a single institution. Data structures would be vertical, reaching into the K-12 schools locally, at the district level, state-wide, and nationally. Integrated data structures would populate from prison systems needing, wanting, or successfully offering school programs for youth and adults in the justice system. For students seeking trade programs, the school to prison pipeline could be disrupted through collaboration between faculty, staff, and K-12 administrators.

# Accessibility

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Access for students with disabilities is often reactionary, put in place after the student makes a request for access or for an accommodation. The migration of courses in higher education online, however, caused a shift in that paradigm, suggesting institutions think about access and accessibility proactively. Accessibility experts, disability services professionals, and instructional designers began to advocate for ensuring accessibility in the design of courses long before students could make their needs known, understanding that the online course environment was a lot like the built environment. As such, including universal aspects of access in online course design before a request could be made would create more inclusive learning environments for all students.



The migration of courses in higher education online, however, caused a shift in that paradigm, suggesting institutions think about access and accessibility proactively.

However, traditional models of providing access for students with disabilities reactively and upon request are pervasive in higher education. Institutions still primarily look for and rely on data about the number of students accommodated and details about the types of accommodations granted to guide decisions. Administrators, faculty, and staff often use this data to both support and argue against the effort required to ensure access for students with disabilities. Lost in this shuffle is learning about the experiences of students with disabilities in post-secondary courses that can provide insight into the efficacy of course content and guide future content decisions. Information about how students access digital content, the accommodations implemented, and students' academic outcomes when accommodated can become important landmarks in a comprehensive, integrated, and inclusive data system.



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Reliance on incidence data about the number of students with disabilities using accommodations offers an incomplete picture of the impact of accessible digital content across the institution. Notably, this data leaves out how students without disabilities can and do benefit from proactive measures used to ensure that there is choice and flexibility in how they access course content, particularly digital course content. Gone are the days when students rely solely on print materials to consume their content. The advent of mobile technologies, such as smart phones and tablets, and voice assistants have changed the way everyone accesses digital content. Students have options, and course content should reflect those options. But how do course designers, faculty, and subject matter experts choose from among those options? What can the experience of students with disabilities tell them?

Digital content in post-secondary courses offers students multiple ways of consuming and working with it. Written content in digital files can often be used with various technologies to allow students/users a choice in how to work with it, including adapting it into various formats that best meet their needs.

It is possible to gain valuable insight into the format and preferences of students by tracking how they interact with those files, but it can also be analyzed to provide additional insight into the difficulties students might encounter with that content and how to share that content in the future. For instance, faculty can review data about files through tools like Anthology® Ally to determine how often a particular document has been downloaded and in what format. If the document has been downloaded repeatedly and converted to an audio format, it may suggest that course designers and faculty may want to consider sharing more audio files in the course to cover significant topics and help students understand and master the content as a supplement to the written material. If a video has been posted online as part of a class assignment, but data suggests that students are opting to read the transcript in lieu of watching the video, it could suggest that print is a more effective format to convey that content and future course updates could be planned accordingly.

Data regarding how students are using content can also be analyzed with course outcomes for students who do and do not use accommodations. There are several ways that these data can be compared. First, how are students who are using accommodations performing in the course? Are they passing the course? What is the distribution of grades and how does it compare to students who are not using accommodations? Students with disabilities are generally considered an at-risk population of students in higher education, so understanding how students are using accommodations and what the pass/fail rates and other metrics are as related to academic performance can provide insight into the efficacy of accommodation.

Next, how is the content available in the course being used? While not all institutions will have a tool like Anthology Ally available, there are other metrics regarding click rates and access to content that can be included in this analysis. Are there some pieces of content that students seem to be accessing more often than others? Can any correlations be drawn between how students are accessing the content in a module and the grades earned on the learning activities and/or assessments in that module? Are there differences between the grades of students who used accommodations and those that did not? It is not likely that the data will be granular enough to allow tracking of how the content is used by individual students, but are there any associations that can be drawn from the data that can guide future content decisions?

Extended time accommodations are often thought of in terms of how much more time an accommodated student receives to complete a timed exam or quiz, but the use of extended deadlines and extensions for assignments have increased in frequency across many higher education institutions. If this accommodation is used at a particular institution, tracking when students are submitting their individual assignments and how much extra time they have taken between the deadline and the submission may yield some interesting insight into the assignment. When considered with grades earned on the assignment, data about how much time passes between the deadline and submission may facilitate understanding about measuring student learning and the rigor associated with the learning activities.

In 2009, the Department of Justice and the Office for Civil Rights released a Dear Colleague letter to college and university presidents highlighting the importance of creating digital content that was accessible at the time of deployment, regardless of the enrollment of students with specific disabilities and disability related needs. In the years that followed, accessibility experts recommended that institutions consider adding accessibility requirements to their procurement policies and procedures, suggesting that higher education could influence the market by communicating to vendors and suppliers that only accessible products would be purchased. This became a common element of resolution agreements made between the Office for Civil Rights and institutions of higher education with complaints from students and others regarding digital accessibility. As a result, many institutions implemented policies and procedures that required consideration of accessibility at the point of procurement. As these policies have been implemented and more accessible educational technology has been available as a result, what has been the impact on access for students with disabilities? Can institutions see the benefits of this work in academic outcomes as well as persistence and retention rates of students with disabilities? How have the outcomes in these courses changed over time, especially from before and after the accessible content was available? This is another way that accessibility data can guide future decision-making regarding course content.

Moving from a data strategy that relies on the population of students with disabilities and how they use accommodations to understand how accessibility influences academic outcomes can have other benefits. This data can be used to construct awareness building and professional development activities for faculty, staff, and administrators regarding accessibility. It also makes a more compelling argument about the need for access than incidence numbers can and therefore, are less likely to be used to argue against accessibility accommodations. Aside from creating more accessible content, this may also impact students. Understanding how digital content that is designed to be accessible is related to academic outcomes may induce students to seek out accommodations instead of struggling without them because of the stigma and negative perceptions about disability that are pervasive throughout higher ed and society.

This kind of work empowers our students, faculty, and staff to succeed. The imperative is to shift from a compliance/accommodation frame to one of understanding and adapting environments because it's the right thing to do.



# Summary and conclusion

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Colleges and universities are poised to be able to leverage the wealth of data already on their campuses. The previous significant technical challenges to combining various silos of data are now challenges that are routinely being overcome. The question, then, is “now what?” Understanding what is possible and how data and analytics can be put in service of human-centered, data-informed decision making opens up exciting new opportunities to better serve students, increase learning outcomes, and create organizational efficiencies. The thoughts of our data fellows here are meant to generate ideas and get your data working for your organization.

Looking across the four areas of focus – teaching and learning; administration; diversity, equity, inclusion, and student well-being; and accessibility, a set of themes emerged:

- The critical need for data literacy and data fluency for all roles – administration, faculty, staff, and students
- The significant role of change management, which may need to include incentives for change
- The idea that much of the required data already exists, but it needs to be combined and used
- The idea of actionability – what problems are addressable using data?
- The need to measure the results of data-informed interventions and actions. What is working, and for whom?
- The need for access and transparency in data analytics – democratizing the data

As we move into 2023 and beyond, institutions should inventory the set of systems that are used across all facets of the operation and understand what data are available to support the kind of intelligence outlined in this paper. From there, identify which datasets could be optimally combined to provide new insights for decision makers, remembering that “more data” is not always “better insights”.

Anthology is well underway in aligning our products – and the data they create – to help institutions power those insights.

## About the Authors

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Dr. Szymon Machajewski is a prolific code writer and gamification leader focused on student engagement through learning analytics. Dr. Machajewski has taught computer science since 2003 and is also certified in mental health first aid. He is a member of the Anthology Community Leadership Circle—a governance board appointed to lead and influence initiatives for the global education community. He also serves on the EDUCAUSE Student Success Analytics CG Steering Committee and UIC Electronic Information Technology (EIT) Accessibility Policy Committee.



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Kelly Hermann is the vice president of accessibility, equity, and inclusion for the University of Phoenix. Her oversight includes the university's accessibility initiative, including the evaluation and remediation of curricular resources. Her supervision spans the Accessibility & Disability Services Office, which provides accommodations to students with disabilities. She also oversees the Office of Educational Equity, which works with university stakeholders, community partners, and corporate sponsors to create an inclusive educational environment for the students, faculty, and staff. Prior

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Ciji Ann Heiser, Ph.D., serves as the senior impact advisor at Developing Capacity Coaching. She leads assessment, evaluation, and strategic planning efforts with an equity-centered lens. As a mixed-methodologist, her skills in qualitative and quantitative instrument design and analysis are critical to asking questions, finding answers, and telling the stories that matter and represent a wide diversity of lived experiences necessary to advance equity and disrupt injustice. For over 10 years, she has worked with organizations in higher education and in the K-12 environment to foster continuous improvement, conduct impact evaluation, and lead strategic planning.

# References and Resources

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