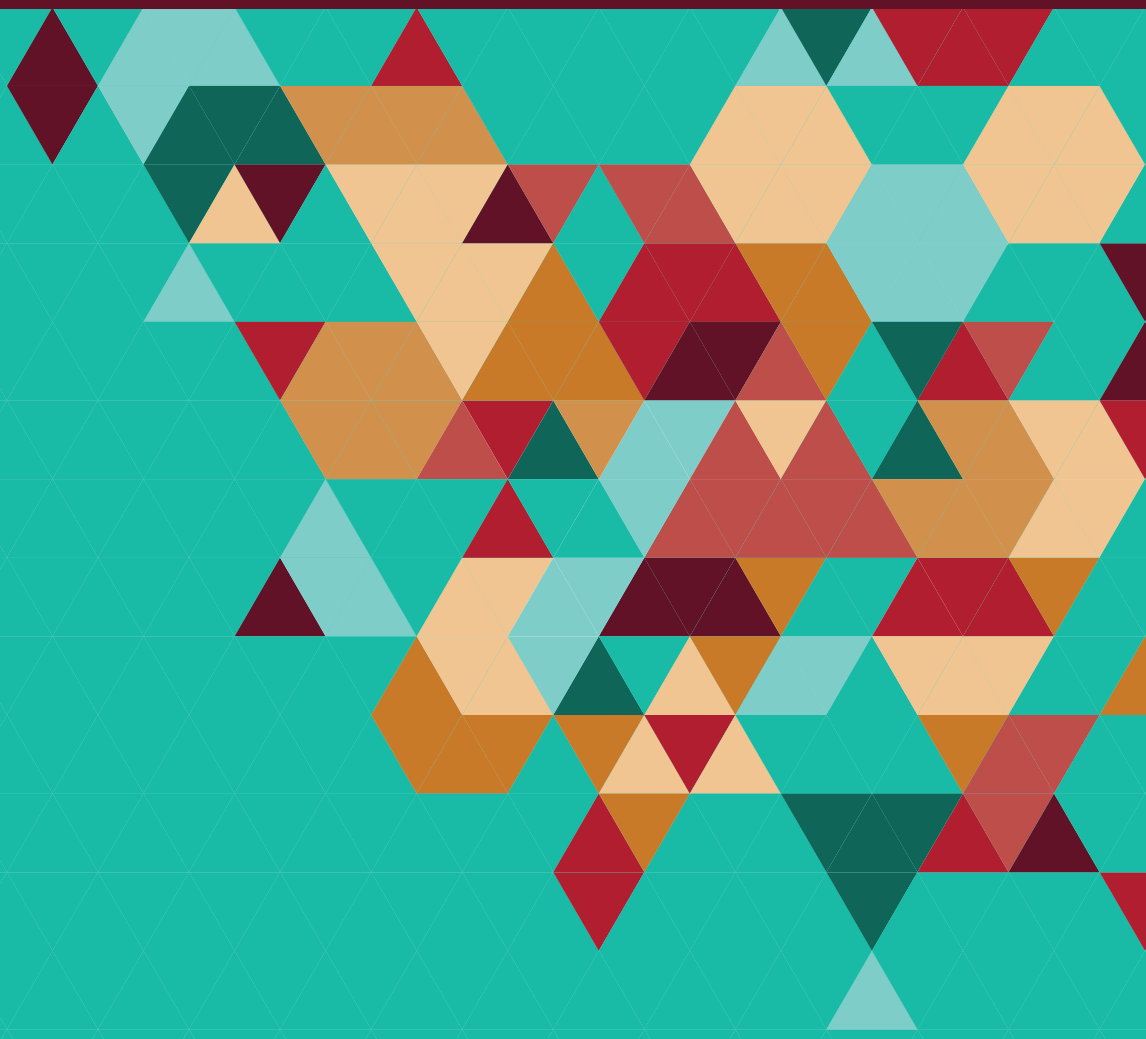
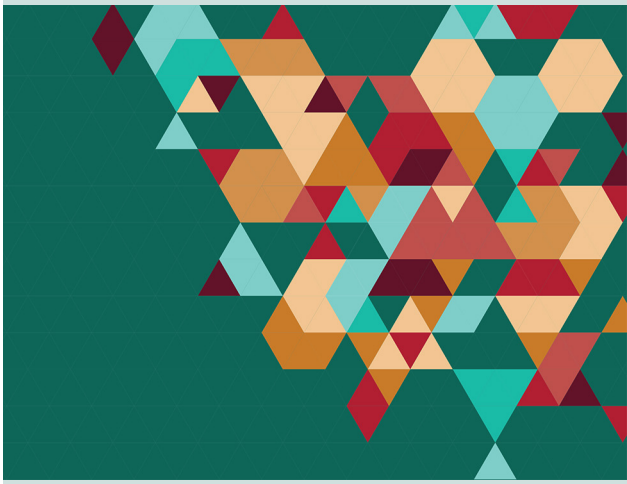
EDUCAUSE CENTER FOR ANALYSIS AND RESEARCH

Learning Analytics in Higher Education



EDUCAUSE

Contents



Authors

Pam Arroway, EDUCAUSE

Glenda Morgan, Gartner

Molly O'Keefe, Consultant

Ronald Yanosky, Consultant

Citation

Arroway, Pam, Glenda Morgan, Molly O'Keefe, and Ronald Yanosky. *Learning Analytics in Higher Education.* Research report. Louisville, CO: ECAR, March 2016.

EDUCAUSE

EDUCAUSE is a nonprofit association and the foremost community of IT leaders and professionals committed to advancing higher education. EDUCAUSE programs and services are focused on analysis, advocacy, community building, professional development, and knowledge creation because IT plays a transformative role in higher education. EDUCAUSE supports those who lead, manage, and use information technology through a comprehensive range of resources and activities. For more information, visit educause.edu.

Executive Summary

With this report, the EDUCAUSE Center for Analysis and Research furthers and deepens an inquiry it first launched in 2012. Analytics—the use of data, statistical analysis, and explanatory and predictive models to gain insight and act on complex issues—continues to be a topic of interest and demand among college and university leaders. Whereas our original study defined analytics in a singular sense, this new study deepens our understanding by distinguishing institutional analytics (intended to improve services or business practices) from learning analytics (intended to enhance or improve student success). Although the two share many characteristics surrounding interest, investment, and implementation, institutional analytics currently dominates conversations, while learning analytics remains somewhat less evolved on most campuses.

Even though we separate the two types of analytics in this report in order to better understand learning analytics specifically, the two still share many characteristics. Both require data quality, technical infrastructure, stakeholder buy-in, and support of senior leadership for effective use. Learning analytics, however, presents additional unique challenges related to higher education history and culture, methodological difficulties when measuring "learning," immature tools and processes, and a longer time lag before outcomes can be assessed. Institutional analytics dominates learning analytics in nearly every way at this time, being of higher interest, priority, and demand.

What can institutions do to more effectively implement and use learning analytics? First, engage a variety of stakeholders across units to increase buy-in and identify new funding sources. The more diverse the support and funding base, the more likely learning analytics is to become a shared investment and not an independent resource. Establishing a shared understanding of motives, goals, scope, and outcome measures can create a unified understanding of learning analytics' resources and potential. A mature data governance system, IT systems and infrastructure support, and appropriate analytics staffing can provide a support base that strengthens the foundation of learning analytics. Finally, institutions may find increased buy-in and support by proactively using learning analytics for a few selected initiatives focused on targeted specific key stakeholders on campus. Those who see the benefits of learning analytics can be effective allies when pushing for further acceptance and use. In addition to these specific suggestions, we also advise participating in the annual EDUCAUSE Core Data Service (CDS), which includes the EDUCAUSE analytics maturity index and the student success technologies maturity index, to assess institutional strengths and weaknesses and to identify the investments that are likely to have the greatest impact.

Although learning analytics lags institutional analytics, internal and external pressures are clearly increasing for institutions to use analytics to assess student success and resource management. Gartner predictions for the digitalization of education are in tune with the trajectory of learning analytics in higher education. Measuring student outcomes, growing personalized learning and adaptive learning technologies, and investing in effective learning analytics are among their key findings for 2016.[1] We believe colleges and universities have an opportunity now to proactively establish processes, understanding, and the use of analytics and establish themselves as the owners of and drivers in the future of learning analytics.

Key Findings

- Learning analytics is an interest rather than a major priority at most institutions. Following suit, investment in learning analytics is more often described as minor rather than major. While learning analytics is not widely implemented or used at this time, there is potential for notable growth in the future should institutions meet indicated priority and investment expectations.
- The key factors that motivate investment in learning analytics are student retention, course-level academic success, and reduced time to degree. Reducing costs and optimizing institutional resources are second-tier factors for investment.
- Institutions more commonly use learning analytics data to monitor or measure student progress than to predict success or prescribe intervention strategies. The latter activities are indicators of true learning analytics, while the former are conventional best practices of using data and information in traditional ways to inform decisions.
- Major challenges to embedding the use of learning analytics into institutional practices include data-quality concerns, system-integration difficulties, lack of support of key leadership, and a possible faculty culture of resistance.
- Student success technologies are not yet mainstream, though initial and planned deployments suggest significant relative growth in adoption.
- Student success maturity index data indicate a middling-to-good level of maturity (3.6 on a 1-to-5 scale). The areas with the most room for improvement are technologies and information systems that support student success initiatives, and analytics maturity specifically related to student success.
- Learning analytics outcomes are difficult to assess due to the lag time required to measure the results of analytics-triggered interventions. Although some quick wins might result from implementing learning analytics systems and programs, institutions will need time to assess the impact of learning analytics initiatives as students progress through courses and programs.

Introduction

A 2012 report from the EDUCAUSE Center for Analysis and Research (ECAR) recognized analytics in higher education as a "hot topic." Analytics continues to garner attention from colleges and universities, making up four of the EDUCAUSE top 10 strategic technologies in 2015 and two in 2016, when "BI and Analytics" ranked seventh among the top 10. Both internal and external forces continue to bolster interest in analytics use by colleges and universities. Enrollment competition, accreditation requirements, political pressures, and a focus on student success are just a few of the current challenges institutions face. This sustained focus on analytics led us to reassess our original findings and delve deeper in 2015.

This report narrows our earlier study, focusing on more granular types of analytics and issues that have emerged since 2012. After the 2012 report, it became apparent that "business analytics" was an overly broad category, so this year we are distinguishing between institutional and learning analytics. This report focuses specifically on learning analytics, which, while often sharing similar trends and traits as institutional analytics, includes qualities and patterns variable enough to require independent study.

As in 2012, we have gauged the state of analytics both through survey responses from EDUCAUSE member institutions and with qualitative input from focus groups and subject-matter experts. Additionally, we have been able to draw from discussions by participants in a June 2015 Administrative IT Summit cohosted by the National Association of College and University Business Officers (NACUBO) and EDUCAUSE. Summit participants included leadership and professionals from the information technology (IT), institutional research (IR), dedicated analytics, and business and finance units. Our survey was directed at each institution's primary EDUCAUSE representative, usually the CIO. Focus group participants included leadership and professionals from the IT, IR, dedicated analytics, and business and finance units. (See the "Methodology" section for more details.) We have collected new information about staffing and future analytics plans. We have also assessed trends in analytics and student success maturity using the maturity index that we developed in 2012 and later revised and incorporated into the 2014 EDUCAUSE Core Data Service (CDS) survey. The CDS survey collects a wide variety of information about the institutional IT environment and feeds a benchmarking service that colleges and universities use to inform their IT strategic planning and management. In this report, the 2014 CDS data supplement information gathered in the 2015 analytics survey. The narrowed focus on learning analytics provides an opportunity for institutions to better understand the potential uses of learning analytics to proactively address their needs and the challenges facing them today. We hope this report helps colleges and universities evaluate and maximize their use of learning analytics.

Defining Learning Analytics

We define analytics as *the use of data, statistical analysis, and explanatory and predictive models to gain insight and act on complex issues*. It's important to note that our definition emphasizes explanation, prediction, and action, not mere data collection and reporting. This sets a standard that—as results presented here show—institutions of higher education often struggle to meet.

Even a strict definition, however, may be too broad to illuminate important distinctions in the way analytics is applied. Despite its origins in statistical science, analytics in recent history has largely been thought of in business and administrative contexts. But this is changing fast. The "big data" phenomenon has spread to a vast variety of activities, very much including teaching and learning, and there has been a corresponding explosion of interest in applying analytics to new realms.

With this in mind, in our 2015 study EDUCAUSE introduces a distinction in the application of analytics in two major areas of endeavor. As we use the terms here, *learning analytics* is the application of analytics to enhance or improve student success, and *institutional analytics* is its application to improve services and business practices across the institution.

We recognize that learning analytics will, to many, refer to the activity defined by the Society for Learning Analytics Research: the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs.[2]

For the purposes of this report we are using *learning analytics* as a simple label for a complex topic that includes learner metrics (students' knowledge absorption), matriculation-related success metrics, and the related systems and resources that contribute to learning and conventional measures of success.

We also acknowledge that the boundary between learning and institutional analytics is more of a gray zone than a defined line and that activities such as managing enrollment and optimizing retention have both student success and business implications. Learning is, after all, the business of higher education. We have tried to use common sense in deciding what constitutes learning analytics and have not insisted that every activity, tool, and practice belong to one category or the other.

Learning Analytics Drivers

Despite continuing interest and investment in analytics in general, learning analytics lags institutional analytics when it comes to priority and investment. In order to understand the use of learning analytics in higher education, it is useful to explore the motivations and extent to which institutions are deploying and using it.

Priority and Investment

A flourishing student success movement,[3] excited discussions of new pedagogies and learning technologies,[4] and a prominent trend to tie public funding to academic performance[5] all might lead to the impression that learning analytics is a top priority at colleges and universities. Improving student outcomes and optimizing educational technology (which included business intelligence and analytics) ranked as second and third among the 2016 EDUCAUSE top 10 IT issues.

That said, interest in learning analytics hasn't yet translated into making learning analytics an institutional priority. Neither survey findings (which were primarily from IT leaders) nor focus group comments (which were from a broader sample of institutional constituents) indicated that interest and priority tracked on the same trajectory or at the same velocity. Only 23% of respondents to the 2015 EDUCAUSE analytics survey said learning analytics was a major institutional priority; another 26% identified it as a major priority for some departments or units, but not an institutional one. For 4 in 10 respondents, it was "an interest, but not a priority." By contrast, twice as many (47%) described *institutional* analytics as a major institutional priority, and an additional 30% called it a departmental one. It is important to note that interest and priority may align differently among different populations of institutional employees. Learning analytics may be reported as a higher priority among academic leaders than among IT professionals.

Institutions do not differ significantly by Carnegie class in the priority they assign to learning analytics. However, there were notable differences between institutions with public versus private control. While public and private institutions are about equally likely to report it as a major priority, public institutions are more likely to call it a departmental or unit major priority (33% public versus 15% private), while privates in turn more often call it an interest but not a priority (36% public versus 53% private).

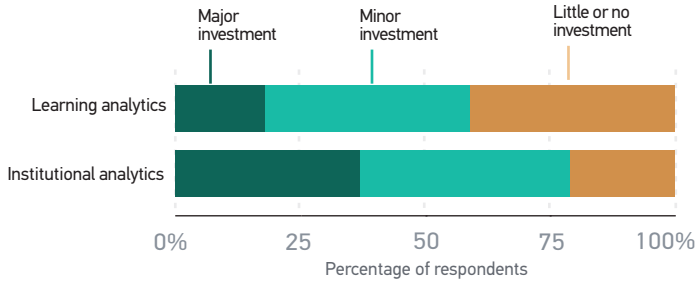


Figure 1. Investment in analytics

A similar pattern appears in investment results (figure 1). Fewer than 2 in 10 respondents characterized learning analytics investments as major, while 4 in 10 reported little or no investment. For institutional analytics, major investment was reported at double the rate for learning analytics, and little or no investment at half. Publics reported major investment in learning analytics at substantially greater rates (26% versus 12%), while privates were more likely to report little or no investment.

One cannot help but notice the irony of widespread cultural recognition of the importance of learning analytics and IT leadership's high prioritization of student success issues and, on the other hand, the seemingly contradictory levels of importance or investment survey respondents and focus group members reported for learning analytics. What may be causing this apparent opposition in viewpoints? Perhaps there is an "action lag"; although the issue is rising on higher education's radar, the cultural shift often required for successful analytics adoption can take significant time, and both the data and the systems necessary for implementation can require substantial effort to put in place. Both technology and higher education move at an increasingly fast pace today, targets move on a regular basis, and major change initiatives take time to develop. It is also possible that the viewpoints of IT leadership, survey respondents, and focus group participants deviate due to diversity in roles and experience. Regardless of the reason, it will be important to reassess this apparent contradiction in the future as learning analytics matures.

Why Pursue Learning Analytics?

Implementing learning analytics allows institutions to more proactively monitor and understand their learners and the barriers to student learning. Given the current higher education environment of increasing accountability for student success and resource management described earlier, it is not surprising that survey respondents' motivations for pursuing learning analytics generally reflect these demands. Increasingly stringent accreditation practices,[6] growing interest in performance funding models,[7] concerns around financial aid practices and student debt,[8] and the need to prepare graduates for the workforce[9] underscore the importance of employing learning analytics.

Figure 2 displays survey respondents' motivations for investing in learning analytics. Three of the top five motivators relate to academic success: increasing student retention (34%), improving student course-level performance (19%), and decreasing time to degree (19%). Conversations among focus group participants mirrored these survey responses, with members reporting that learning analytics allows them to better understand student decisions related to success.

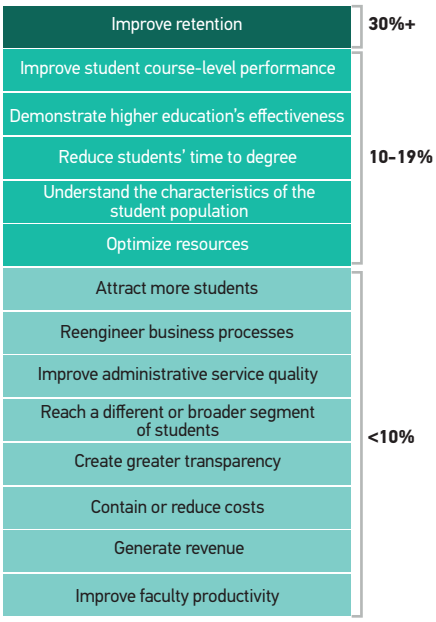


Figure 2. Motivations for investing in learning analytics

One focus group member provided a specific example of how using analytics allowed the institution to better understand typical student responses, revealing previously unrecognized challenges: "I used to think that people who were not successful in their freshman STEM courses would just go into liberal arts disciplines. In fact, they disproportionately leave the institution." New knowledge such as this provides opportunities for increased proactive and preventive responses to typical challenges, but institutions are not necessarily taking advantage of those opportunities.

Caveats and Cautions for Data Gaps in Learning Analytics

When monitoring time to degree, learning analytics often provides only an internal perspective based on quantitative progression data or data from other institutional systems with compatible, interoperable data schemas. Personal and noncognitive factors such as family responsibilities, work schedules, and behavioral patterns are not typically captured as part of routine operational data collection efforts. As we note in the ECAR report *IPAS Evaluation and Assessment Guide*, "Qualitative data can help tell individual stories or put flesh onto concepts and processes … [and] affords the opportunity to tell a more comprehensive story."[10] Drawing upon quantitative data from sources such as career counseling and advising units may provide a more complete understanding of factors affecting time to degree.

Colleges and universities must also increasingly provide greater evidence of their effectiveness and closely monitor resource use. Illustrating this, nearly two in five survey respondents indicated that demonstrating higher education's effectiveness is a motivating factor for employing learning analytics, and optimizing resources is also a concern (12%). Focus group members provided further context, identifying administrators, accrediting bodies, and state governments as sources of pressure to use analytics in more meaningful ways.

Motivations for pursuing learning analytics are diverse, with respondents identifying a wide variety of competing interests and concerns. The most consistently reported reasons relate primarily to student success and institutional effectiveness, providing institutions with an opportunity to create a cohesive, holistic argument in support of learning analytics use on campus.[11] Recognizing major areas where implementing learning analytics could provide substantial support for these initiatives could result in greater interest and investment.

The Low Profile of Learning Analytics

As noted previously, learning analytics lags institutional analytics in both priority and investment. It is important to note that the two are not mutually exclusive and often comingle in practice. While we may not yet have a clear understanding of the overlap or variances, we can speculate to some extent on the basis of focus group discussions and higher education context.

Interest in optimizing business practices for efficiency is driving analytics maturity in higher education more than interest in improving student outcomes.[12] This finding was echoed by some focus group participants, with one member specifically noting that "the enrollment side is more mature than the educational side." This is not surprising, because standard institutional data resources tend to be more quantitative, routinely collected during operational activities, and stored in centralized repositories. As a result, institutional analytics data and tools are often both more available and widely used.

Learning data have become more accessible only in recent years with new developments in online environments, such as the learning management system, as well as the emergence of technical standards such as Caliper. But institutions still have access to only a portion of learning data; much of it still is not captured. There are a limited but growing number of learning analytics tools, and most of those are still in their early maturity. In addition, the skills required to manage large and complex data sets are not widely distributed and are in general less prevalent in parts of the institution more focused on learning analytics.

In spite of the lack of priority given to analytics, there is a substantial amount of interest in higher education in the use of data to drive improvements. Though a focus on data is not a new phenomenon, higher education institutions increasingly differ in what data they consider important and useful. This applies not just to the data collected, but to that actually used to drive change. Varying institutional identities and challenges contribute to comparable variance in what data are considered "mission critical." One focus group member pointed out differences in what community colleges and four-year institutions are concerned about, distinguishing between having a "selection problem" versus an "enrollment problem," depending on the institutional mission. A second participant echoed this idea, stating that "each school has its own sort of criteria upon which it can then take that data and assess its own successes or lack of successes."

In addition, some colleges and universities prioritize learning analytics at the departmental or unit level rather than considering it an institutional initiative. One focus group participant noted that departmental accreditation efforts primarily drive learning analytics use at his institution, but leadership is

interested in moving it forward as more of a university-level effort. The focus group member stated, "A lot of the administrative staff are the ones that are starting to say, 'Well. Here's other things that are happening. Should we be paying attention as a university?' People are interested, but there's a real concern about the burden of starting something." While colleges and universities may be increasingly looking at learning analytics as an institutional initiative, at this time it often remains compartmentalized for departmental purposes.

Traditional reporting requirements usually focus primarily on descriptive data, but they increasingly include predictive and prescriptive analyses tied to financial rewards and penalties. Institutions may struggle with this transition, with one focus group member admitting, "We say we're doing analytics, but all we're really doing is running the same enrollment reports and then some retention reports." Participants in the 2015 EDUCAUSE/NACUBO Administrative IT Summit had similar concerns, sharing that they primarily have a culture of operationally driven data use focused on counting, and not a culture of measurement.

In addition to data and reporting challenges, summit participants expressed concerns that faculty at their institutions are resistant to using learning analytics. While that might be the case in some institutions, ECAR research on faculty technology experiences and expectations found evidence to the contrary. In a survey of over 13,276 faculty across 139 institutions, ECAR found that faculty are quite supportive of analytics technologies designed to improve student outcomes.[13] Overcoming real and perceived faculty culture barriers to analytics is essential to a successful learning analytics strategy. Student learning and success are traditionally considered the faculty domain, and while faculty indicate support for the use of learning analytics, they may be wary of the ability to quantitatively measure or improve student outcomes. Focus group participants confirmed that analyses that appear to question faculty practices affecting course or student performance can seem threatening, particularly when lacking context. Faculty, already wary of and often resistant to measurement, may be suspicious of motives, data quality, and interpretation. Participants in the Administrative IT Summit concurred that faculty suspicion and fear can torpedo analytics results before they are able to add value.

While we might not have a full understanding of the reasons for higher levels of adoption of institutional analytics as compared with learning analytics, the reality appears to be that learning analytics is the harder of the two to implement. This is due to a complex combination of challenges, including heavy focus on operational data, varying institutional concerns and initiatives, available tools, and lack of universal buy-in.

Learning Analytics in Practice

Though learning analytics is not yet reported as a high priority for most institutions, many survey respondents and focus group participants acknowledged specific needs that analytics could support. In addition, they recognize that there are already some systems in place that are collecting data that could be useful in spite of data-integration and -quality challenges.

Functional Data Needs

Colleges and universities need data to address a wide variety of needs and challenges, many of which center on core units and operational functions. As noted earlier, survey respondents indicated that student success and institutional effectiveness are often primary drivers for using learning analytics—not surprising given the breadth of interest in and pressure related to these two functions. Student success and institutional effectiveness initiatives can benefit from available data and analytics due to their focus on learning and academic support such as academic progress, retention and graduation, and academic advising. Student success and institutional effectiveness initiatives are arguably two of the functions most likely to benefit from using analytics in a proactive way to create change for students. In spite of this potential, while some focus group participants indicated that concerns about these issues are driving learning analytics at their institutions, others noted that student success and institutional effectiveness stakeholders are not yet a part of analytics discussions on their campuses.

Operational activities supporting student success are also key areas where student success–oriented learning analytics can be valuable. Core responsibilities of these units often include admissions and recruiting, course offerings and enrollment, degree audit, and financial aid. These activities, often residing in the Registrar's Office, provide students with support that includes evaluating initial chances of success at an institution, targeting tuition discounting plans, and ensuring that students remain on track to successful degree completion. Though operational, these functions can be greatly informed by applying learning analytics to decision making. If colleges and universities understand what factors create success, they can then make decisions in these units to "better the odds" of student success.

A small number of focus group members provided examples of the successful use of analytics for student recruitment and retention efforts. One shared the discovery that "we were not giving the right students the right money. Now, it's fairly objective." Another participant stated, "We drove [the discount rate] down nine points. We did that through predictive analytics."

Once institutions identify the main functional areas that could benefit from learning analytics, it is useful to then identify questions those areas need

answered and even set goals that measure progress. An assessment of what data are needed, what are currently available in university systems, and what are not available and need to be collected can provide direction during implementation planning. This is particularly important when implementing learning analytics, because survey respondents indicated that systems with a strong learning orientation are not used as systemically as those with more of a business orientation and also pose greater data completeness challenges.[14]

Integration and Quality Challenges

As noted above, though data are plentiful at colleges and universities, the plethora of data-collection purposes, points, sources, and systems presents challenges for integration and use. Concerns such as data type variability, universal definitions, and diverse analytical methods further challenge the capacity to use learning analytics, as do questions around who should have access to the data and how use can be best supported by governance activities.

Though there are software packages and platforms available that integrate data and process data, focus group members indicated that systems do not always use the same data formats and often are not interoperable. In addition, they pointed out that many of these resources create an additional cost, when budgets are already stretched. Participants reported that not only do they need consistency in data and between systems, but a level of flexibility must be allowed as well. As one participant shared, "You need flexibility. You need systems that will allow rubrics in one case, objective scores in another case, jury panel somewhere else."

In addition to technological and data-structure complications, survey respondents expressed concerns about data quality and the potential for misuse. Two-thirds of respondents believed that data used for analytics are not always accurate, while more than 7 in 10 had concerns that data could be misused and thus incorrect conclusions could be drawn. Though many institutions attempt due diligence when it comes to ensuring clean data, focus group participants shared that "the best way to find your data quality issues is when people start using the data."

Because inaccurate and incomplete data can result in trust issues, it is critical for colleges and universities to have processes and structures in place to support data cleanliness, consistency, and completeness. An ingrained data governance initiative and the use of data stewards are tactics focus group participants indicated can be useful in both improving data quality and facilitating universal knowledge and understanding across campus. Addressing data-quality questions is critical to achieving buy-in for using learning analytics, and focus group participants believed that clean and accessible data are a sign of a mature analytics program.

Student Success Technologies

Institution-wide implementation of student success technologies is not common overall.[15] Degree audit is the only system respondents reported as widely implemented at the institutional level, with more than two-thirds of respondents indicating they use it at their institution (figure 3). More than a third of respondents also reported institution-wide deployment of credit transfer systems, early academic alert systems, and advising center management systems, while another 1 in 10 have deployed each of the noted systems in a targeted manner. Notably, nearly a quarter of institutions indicated that they have deployed a student success data warehouse or operational data store either institution-wide or in a targeted manner, and one in five have established institutional or targeted student success analytics dashboards.

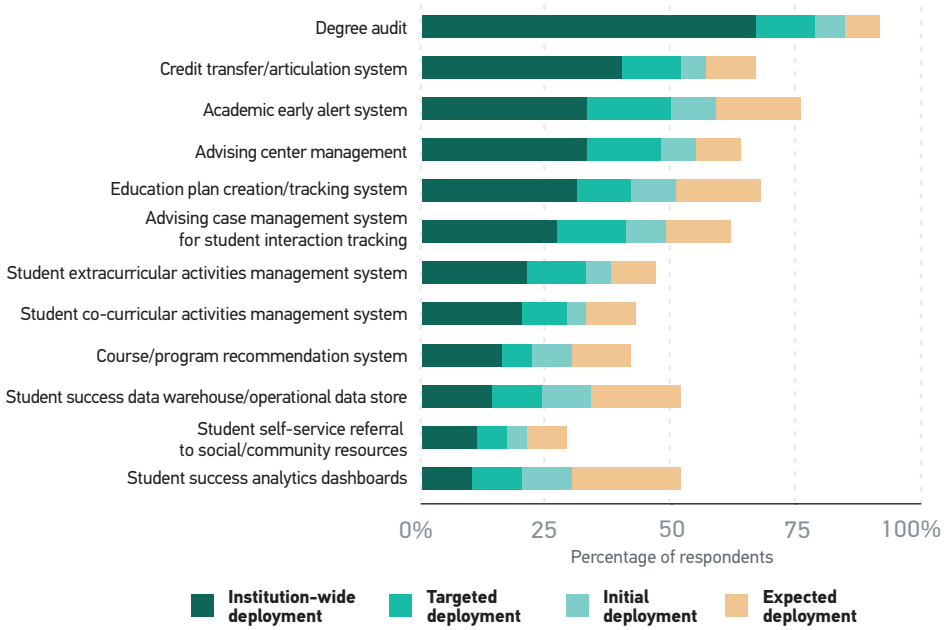


Figure 3. Status of student success technologies

Despite limited deployment of student success technologies to date, there remains potential for increased effort based on survey respondents' feedback that they are either expecting to implement or are in the initial phases of implementation. This finding is corroborated by the 2016 top 10 strategic technologies report, wherein 22% of respondents said they were implementing/expanding their learning analytics technologies, and 55% said they were tracking/planning or piloting/deploying these technologies. Should institutions act on these plans, learning analytics could move from experimental deployment in 2016 to mainstream deployment by the end of the decade.

How Learning Analytics Is Applied

Institutions do indicate interest in advancing the use of learning analytics in the future. In spite of current challenges in assessing specific outcomes attributed to the use of learning analytics that could guide best practices and define successful implementation, we should be able to advance that use if colleges and universities increase investment in it as indicated.

Functional Areas

Analytics is already employed in a wide variety of ways. Most institutions that report broad use primarily apply it for enrollment management (57%) and tracking undergraduate student progress (48%) (figure 4). When we add institutions that report using analytics sparsely for those two functions, the percentages rise to 73% and 69%, respectively. In addition, many institutions use analytics for student degree planning (55%), tracking time to degree (54%), or assessing student learning outcomes (50%).

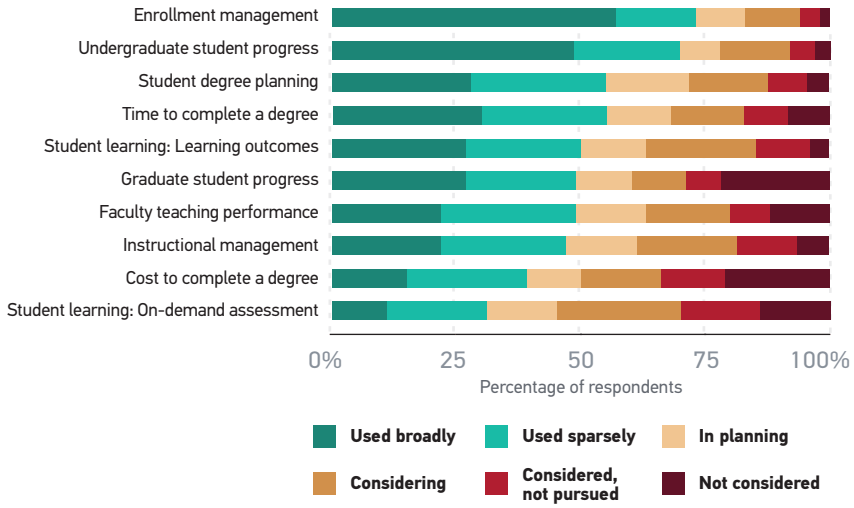


Figure 4. Analytics' current and planned use

Though current use is sparse and falls into just a few functional areas, it is again worth noting that a number of institutions are planning, considering, or considering but not yet pursuing the use of analytics in the future. More than one in five respondents indicated that they plan to use or are considering using analytics in the functions in figure 4, with the greatest focus toward on-demand assessment (39%), instructional management (35%), and learning outcomes (35%). Nearly a third also indicated that they plan to use or are considering using learning analytics in student degree planning and faculty teaching performance evaluation. As with the student success technologies described earlier, should colleges and universities hold true to their desire to incorporate learning analytics into the processes for these functions, the potential remains for a significant shift in the learning analytics culture.

Types of Analysis

When it comes to sophistication in using learning analytics, survey respondents indicate applying analytics to monitoring areas is more common than applying it to predictive or prescriptive uses (figure 5). Roughly two of five survey respondents reported using data for monitoring in each of the functions in figure 5 (range: 28–53%; average: 40%). Enrollment management and on-demand assessment are the only functional uses where fewer than one-third of institutions use the data for monitoring.

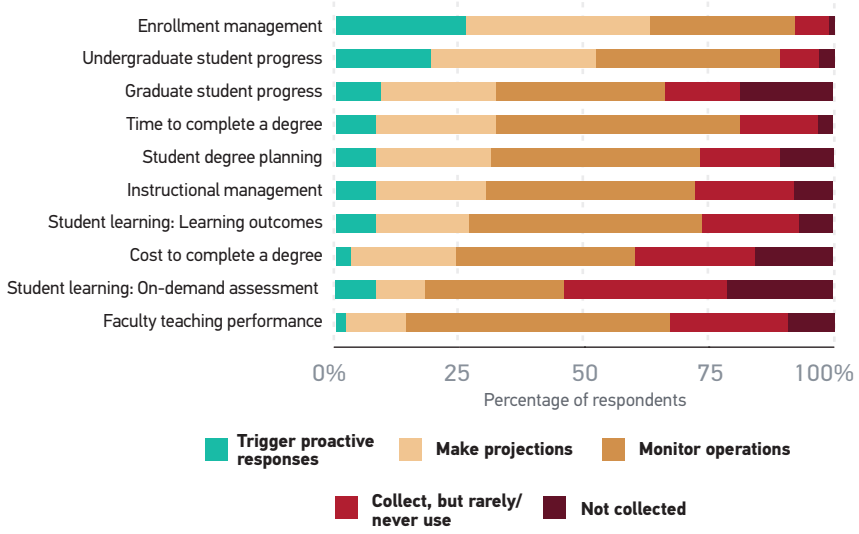


Figure 5. Modes of data use

Not surprisingly, advanced predictive analysis, which provides intervention opportunities such as projections, is relatively rare. When predictive analysis does occur, it is in the same functional areas that report higher use of learning analytics overall: enrollment management (63%) and undergraduate student progress (52%). This makes sense considering the general interests in state reporting, where enrollment projections and degree completion data are core interests. Focus group participants offered further support, indicating that external reporting drives the use of learning analytics data at their institutions. One participant referred to avoiding a "hand slap" from accreditors, while another pointed out that "you need the metrics for your graduate school accreditations."

Indicating further potential, many respondents reported that they collect data that could support learning analytics but rarely or never use them. If colleges and universities make it a priority to engage with the data they make the effort to collect, learning analytics could see increasing application in the future.

Outcomes

Although most survey respondents, focus group members, and EDUCAUSE/NACUBO Administrative IT Summit participants recognize that learning analytics is increasingly critical to their needs and challenges, it is still early in the acceptance and adoption phases at most institutions. Many colleges and universities are in the initial stages of analytics implementation or have not yet started, so it is difficult to evaluate outcomes at this time. Successes reported by Administrative IT Summit participants are primarily implementation oriented, relating to increasing buy-in, strategic hiring of staff to support infrastructure, and the initiation of data-governance efforts. No other survey respondents or participants in focus groups or the summit had much more to share regarding outcomes. Note, however, that there are challenges around a long lag time between initial collection of data and the ability to assess outcomes.

In spite of most institutions being early learning analytics adopters, a "culture of measurement," as one summit participant called it, does appear to be taking hold. Focus group members pointed out that strategic plans increasingly include analytical metrics, and both internal and external constituents are driving collection and reporting of evidence of impact. Evidence of this is seen in recent ECAR research about IT trends. Data-driven decision making is among the most influential of the 29 trends we assessed, exerting a major influence over or already incorporated into the IT strategy at 61% of institutions.[16] It seems clear that institutions can benefit from being proactive in their implementation and use of analytics in an effort to self-define effectiveness as much as possible.

The Role of the IT Organization

Analytics services are most often delivered as a joint program run by IR and IT; where they are not, they are most often run by IR, followed by IT. Our study found that opinions on the optimal role of IT in learning analytics do not differ distinctly from those concerning analytics in general. There are two common streams of thought on the appropriate role of IT: one keeps the focus solely on the technology and infrastructure aspect of analytics support, and the other additionally involves IT in data quality and governance efforts.

Technological support is clearly a fundamental IT role at all colleges and universities, regardless of whether it is directed specifically toward analytics. Supporting core data systems that store university data, providing data integration support, and at times building business intelligence (BI) tools to distribute data to stakeholders are common duties for IT units. Some focus group participants argued that IT should restrict itself to this supporting role, with one member sharing that "our role is to be a service provider for data and let whoever wants to build their stuff go build their stuff."

When an institution adopts analytics, however, deployment and utilization efforts offer IT an opportunity to further participate in data efficacy and governance activities. Focus group participants noted that IT often has an in-depth understanding of data structures and definitions, along with institutional knowledge that makes IT a valuable partner in any analytics effort. One focus group member believes "IT should be shepherding the campus into thinking about data in a different way and then talking about what we've learned through that process to create smart, flexible data sources, data models for people to run with." Other focus group participants spoke of IT having a leadership role in analytics on campus and helping people learn how to "have the data tell a story."

Regardless of differences in vision for IT's role in analytics at colleges and universities, it is clear that IT is a key player in successful implementation and support. Whether IT supports, leads, or participates as part of an analytics team, analytics will not be successful without IT participation.

Assessing Institutional Learning Analytics Readiness

Learning analytics involves the collection, analysis, and reporting of data in order to understand learners and their learning contexts with the goal of improving learning outcomes and student success. Its multifaceted requirements span the institution, involving technologies, data, organizational structures, policies, and cultural practices. How can college and university leaders assess their ability to conduct such complex efforts?

In this section we look at assessment tools that EDUCAUSE has developed for just this purpose (see sidebar). With the help of maturity index data collected through the EDUCAUSE CDS survey, we examine relative maturity in analytics and student success initiatives throughout U.S. higher education. We also suggest ways to address challenges typically found in these areas. Because it deals with the most distinctive elements of learning analytics, we examine the student success maturity index data in greatest detail.

EDUCAUSE Maturity Indices

EDUCAUSE maturity indices help institutions assess their overall capabilities in complex functional areas related to IT. With the help of survey research and guidance from subject-matter experts and IT leaders, EDUCAUSE identifies the distinct dimensions (or factors) contributing to maturity in each assessment area. Each dimension is evaluated through a set of statements to which respondents express their level of agreement or disagreement on a scale of 1 (strongly disagree) to 5 (strongly agree). The maturity score within each dimension is the mean of these responses, while the overall maturity score is the mean of the dimension scores.

Since 2014, EDUCAUSE has incorporated maturity index questions in its Core Data Service survey, permitting a broad evaluation of the state of maturity in functional areas including analytics and student success. Data in this report represent the U.S. respondents to the 2014 CDS survey. There were 532 respondents to the analytics maturity index questions and 550 respondents to the student success maturity index questions.

Analytics Maturity

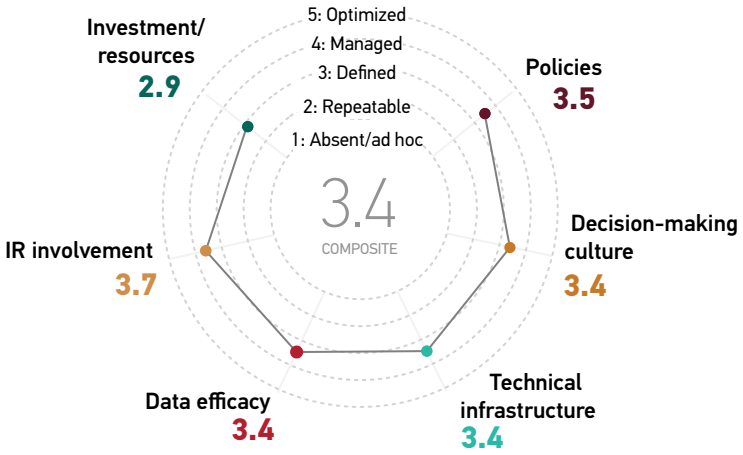
EDUCAUSE maturity and deployment indices assess progress in particular subject areas or disciplines. The current analytics maturity index measures 32 items contributing to analytics maturity and is organized into 6 categories, or dimensions (see sidebar). The current dimensions of analytics maturity are as follows:

- Decision-making culture, including senior leadership commitment and the use and cultural acceptance of analytics
- Policies, including data collection, access, and use policies
- Data efficacy, relating to quality, standardization, "rightness" of data and reports, and the availability of tools and software for analytics
- Investment and resources, consisting of funding, an investment versus an expense mentality, and the appropriateness of analytics staffing
- Technical infrastructure, consisting of analytics tools and the capacity to store, manage, and analyze data
- IR involvement, capturing interaction between IT and IR

It is important to note that the EDUCAUSE analytics maturity index measures overall institutional capability in analytics, not specific competencies in learning analytics. As noted above, at many institutions institutional analytics may well be a higher priority and receive more investment than learning analytics. For assessing learning analytics capabilities, EDUCAUSE recommends using the analytics maturity index in conjunction with the student success maturity index.

Broadly speaking, institutions give themselves middling grades in analytics. The mean overall maturity score is 3.4 out of 5 (figure 6). The highest-scoring dimension is IR involvement (mean score 3.7), and the lowest, not surprisingly, is investment and resources (mean 2.9). Only about one in five CDS respondents agreed that their institution had sufficient funding to meet their current needs.

A detailed list of suggestions for analytics maturity improvement can be found in appendix A. Additional examination of CDS 2014 analytics maturity findings can be found in the EDUCAUSE report *The Analytics Landscape in Higher Education, 2015*.[17]



5: Optimized	Besides measuring performance, we regularly reassess the way we deliver this capability, in order to improve practices and manage risks.
4: Managed	We manage this capability to achieve predictable results on the basis of reliably measured performance indicators.
3: Defined	We have a standardized capability and have documented procedures and/or responsibilities related to it.
2: Repeatable	We have an established capability, but our practices are mostly informal.
1: Absent/ad hoc	We don't currently have this capability, or we address it in an improvised, irregular way.

Figure 6. Higher education analytics maturity, 2014

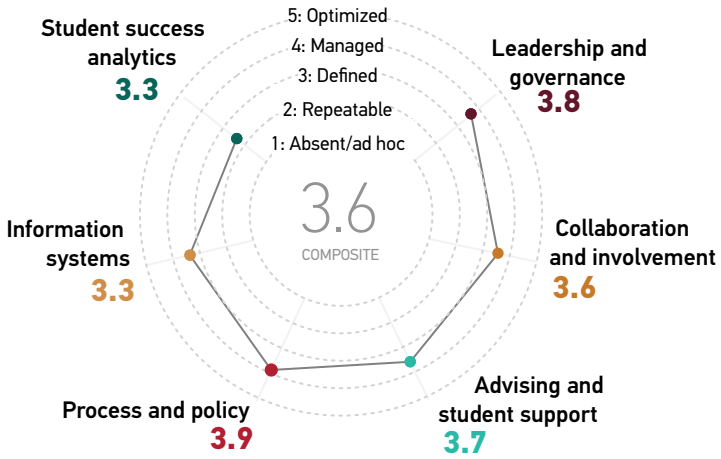
Student Success Maturity

EDUCAUSE developed a maturity index for assessing an institution's capabilities to deliver and support student success services. The current student success maturity index measures 23 items contributing to student success maturity and is organized into 6 categories, or dimensions (see sidebar). The current dimensions of student success maturity are as follows:

- Leadership and governance: funding of student success efforts, commitment of institutional leaders to student success, and mechanisms for making student success decisions
- Collaboration and involvement: interdepartmental collaboration, mutual understanding of goals, and stakeholder participation
- Advising and student support: ability of student advising processes to support student success goals

- Process and policy: existence of policies to support student success and adapt to new methods over time
- Information systems: technology and data support for student success practices
- Student success analytics: ability to apply analytics to student success performance

Overall, CDS respondents rated their institutions' student success maturity slightly higher than overall analytics maturity. The mean composite for student success maturity is 3.6 (figure 7). Several dimensions of student success—notably leadership and governance, and process and policy—approach a mean level of "agree" (4.0), a relatively high score among our maturity indices. Respondents express considerably less agreement, however, about items in the two areas most directly related to learning analytics: student success analytics and information systems.



5: Optimized	Besides measuring performance, we regularly reassess the way we deliver this capability, in order to improve practices and manage risks.
4: Managed	We manage this capability to achieve predictable results on the basis of reliably measured performance indicators.
3: Defined	We have a standardized capability and have documented procedures and/or responsibilities related to it.
2: Repeatable	We have an established capability, but our practices are mostly informal.
1: Absent/ad hoc	We don't currently have this capability, or we address it in an improvised, irregular way.

Figure 7. Higher education student success maturity, 2014

Improving Student Success Maturity

Though CDS respondents indicated a moderate level of student success maturity, focus group participants were decidedly less optimistic about where their institutions fall on the scale. These participants' informal responses to the question of how they would rate their institution's student success maturity on a scale from 1 ("haven't really started yet") to 5 ("we've got this thing figured out") were decidedly pessimistic, particularly about learning analytics. One focus group member insisted on a rating of zero, while most others offered a 1 or 2. None went higher than a 3.

There may be some optimistic bias in our CDS respondents' answers to the specific questions our maturity index asks about student success initiatives, or some pessimistic bias among focus group respondents making a subjective, off-the-cuff assessment. Both groups, however, indicated that there is clearly room for improvement in student success capabilities, and they roughly agreed that the weakest spots are often those that deal directly with analytics. Below, we review each dimension of the student success maturity index results to identify common areas of weakness.

As always, of course, what is typical overall may not apply at a given institution, and we advise that each institution assess its student success maturity in detail in order to better understand how it compares with broader patterns.

Leadership and Governance

Institutions characterize leadership and governance as one of the stronger elements of student success maturity (figure 8). Agreement that senior leaders are publicly committed to student success initiatives is virtually universal; not a single respondent among 550 disagreed, and only a handful rated themselves neutral. Formal bodies to engage stakeholders in decision making and a senior position dedicated to student success improvement are also very common. By far the weakest elements in this dimension are funding of student success efforts and technologies.

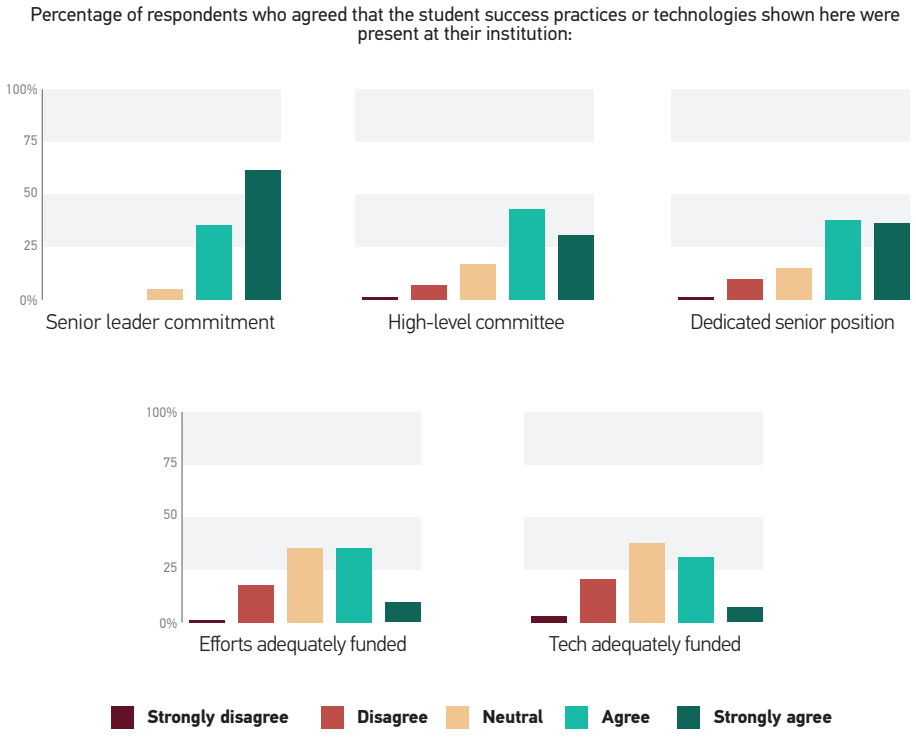


Figure 8. Student success maturity, 2014—leadership and governance factors

Collaboration and Involvement

Collecting, analyzing, and acting on the information needed to improve student success requires the participation and collaboration of many parties who may not be accustomed to working with each other. Challenging as this can be, our respondents largely agreed that departments collaborate and that their institution collects input from multiple stakeholders (figure 9). The weaknesses in this dimension most often involve the lack of consistent definitions for student success and, relatedly, lack of a process for regular communication of student success goals and performance.

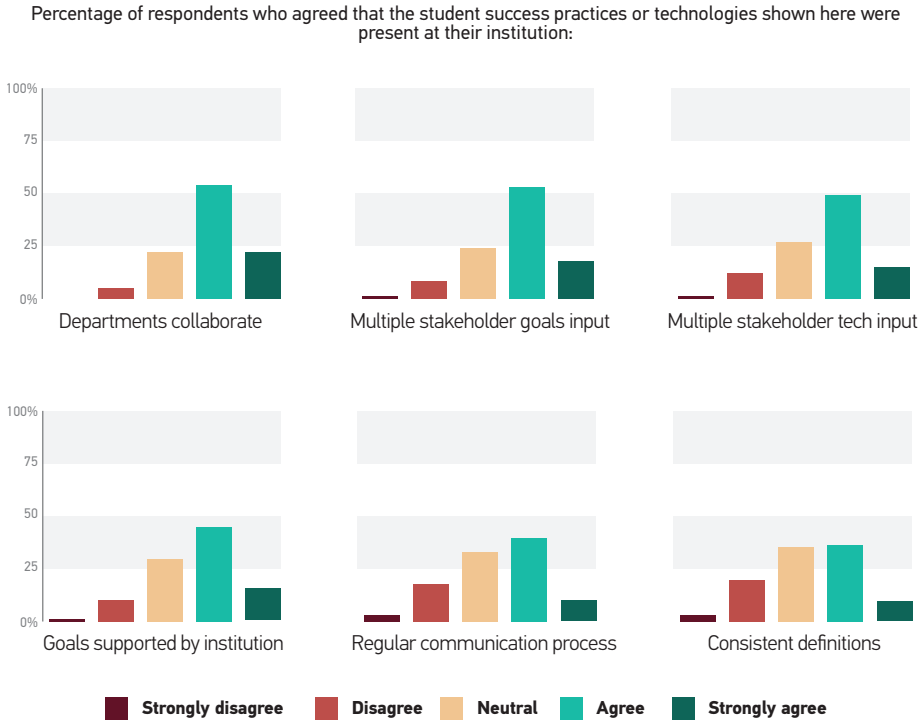


Figure 9. Student success maturity, 2014—collaboration and involvement factor

Advising and Student Support

Advising and student support is one of the higher-scoring dimensions of student success maturity. Nearly 8 in 10 respondents said the support services at their institution effectively support student success goals, and about 6 in 10 called their advising processes effective (figure 10). Faculty participation is more of a challenge; only a little over half of institutions reported that faculty adopt and use information systems that support student success.

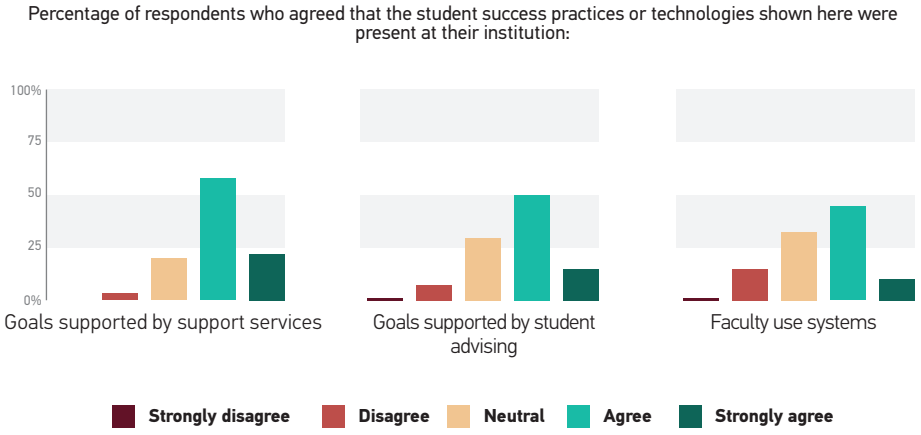


Figure 10. Student success maturity, 2014—advising and student support factors

Process and Policy

Respondents are confident enough about their student success processes and policies that this dimension scores the highest of the six. Large majorities agreed that degree requirements are clear and well documented, that access and information security policies are sufficiently robust, and that student success efforts are adaptable (figure 11). It may be necessary to view these high levels of confidence with skepticism; few IT leaders are comfortable confessing inadequate security practices, and process change is sufficiently difficult in other areas to cast doubt on whether only 4% of CDS institutions lack adaptable student success processes. This could be a sign of the still-emerging nature of the field of student success technologies. While the relative context suggests this to be an area of overall strength, what looks good now may look weak in the future as the bar continues to rise with expanded maturity and deployment of student success technologies.

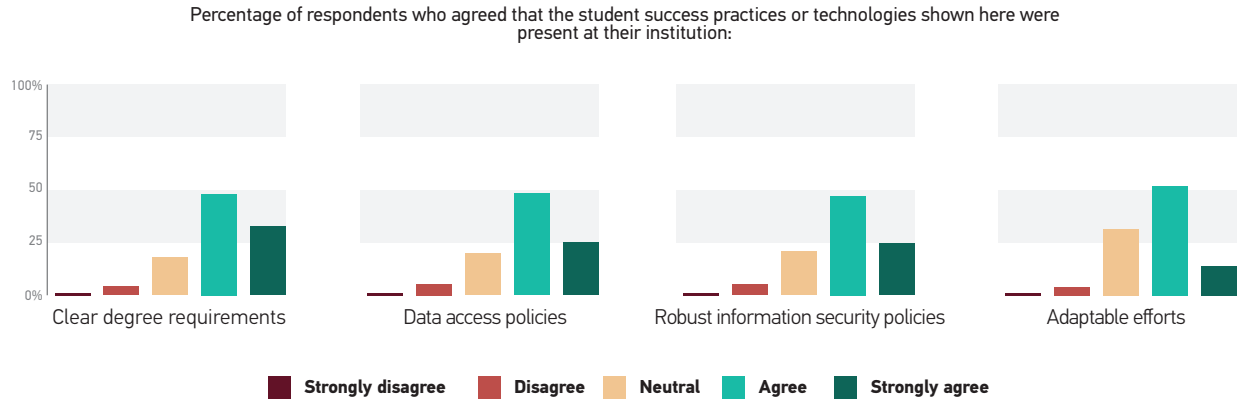


Figure 11. Student success maturity, 2014—process and policy factors

Information Systems

We reported above that most student success technologies are not widely adopted. That may help explain why respondents tended to rate the information systems support for student success relatively low (figure 12). Only one item—having the technology to help students plan a course of study—attracted widespread agreement (66%). Agreement stood at about the halfway mark for technologies used to identify students at academic risk and to track degree progress, both key elements of any student success effort. And respondents were particularly likely to disagree that they shared data effectively among systems or that they had technology to identify nonacademic risk factors.

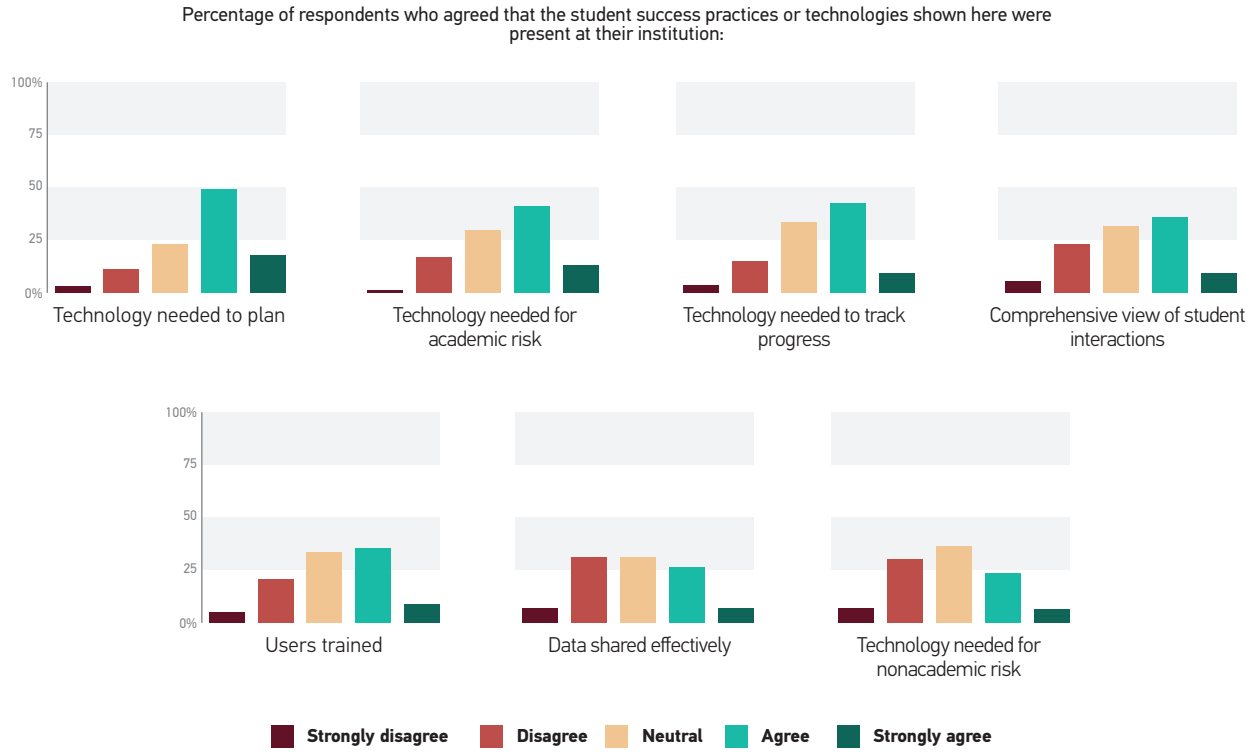


Figure 12. Student success maturity, 2014—information systems factors

Student Success Analytics

Tied for last in student success maturity dimension scores, student success analytics includes the items most closely related to learning analytics (figure 13). Only one of the seven items—identification of key student success outcomes the institution is trying to improve—inspired agreement from substantially more than half of respondents. Lowest agreement goes to items relating to using analytics to effect continuous improvement, predictive analytics, and (familiarly from the information systems results) faculty and advisor use of analytics.

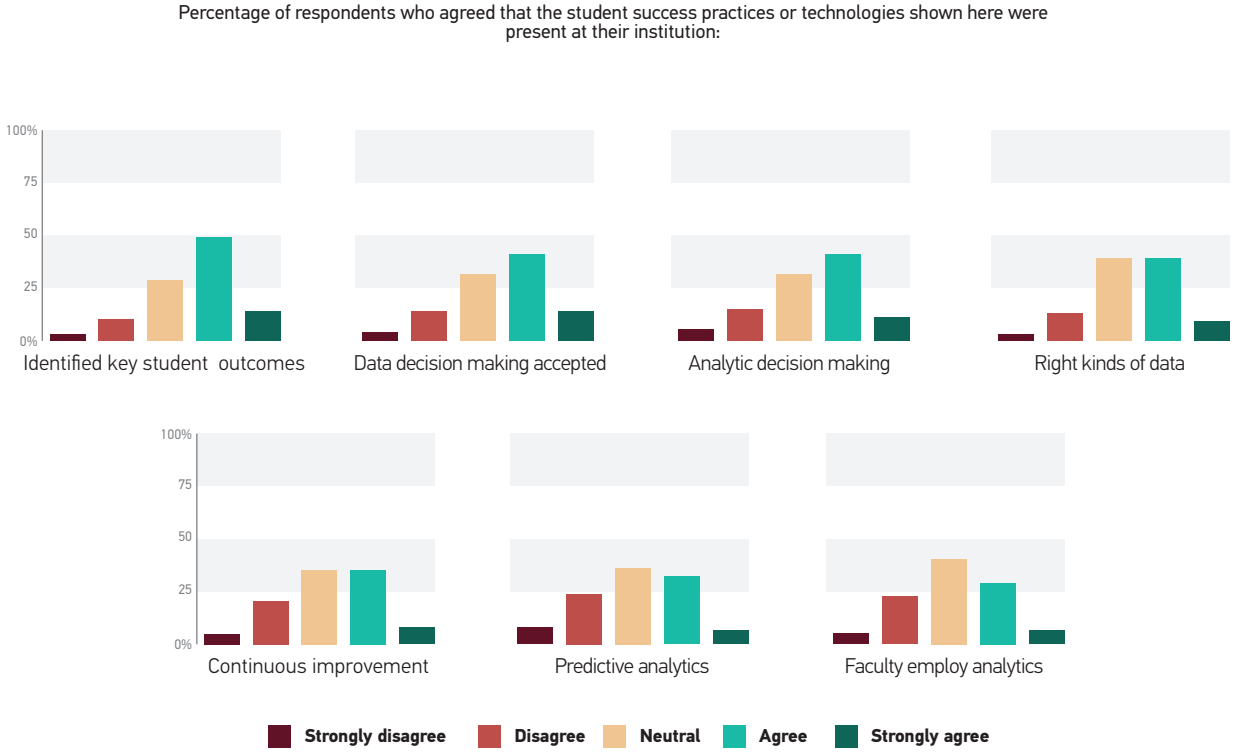


Figure 13. Student success maturity, 2014—analytics factors

Developing a Learning Analytics Strategy

A number of higher education institutions have successfully implemented learning analytics with impressive results. However, many institutions are still struggling or are wondering how to start implementing learning analytics. For all of these institutions, it is essential that they develop a high-level learning analytics strategy to guide their implementation and increase the likelihood of success.

Based on a large number of inquiries across multiple industries, Gartner finds that a key reason for developing a high-level strategy is that colleges and universities typically focus on only one side of the learning analytics equation—the academic/business side or the technical side. The academic/business problem approach to learning analytics is concerned with the academic or business problem that learning analytics is seeking to address, that is, the job to be done, such as improving student learning outcomes, retention, or course completion. Then there is the IT or the data problem, which involves what tools institutions are going to use to implement or support learning analytics, where to find and how to clean the data, how to integrate the data, and how the data should be stored. Higher education institutions typically focus on one of these two approaches, and both have their drawbacks if pursued in isolation.

If the focus is on IT and data, then IT decision makers typically concentrate on the tool, along with the technical and data architecture. Thus they risk ignoring the broader questions of why learning analytics is being pursued and may neglect making a strong business case for it. This could lead to low levels of buy-in by stakeholders, ultimately threatening the success of the project. Conversely, those institutions that focus on the academic or business problem and on the pain points being experienced at the institution tend to use packaged applications to solve domain-specific business challenges.[18] Many of these approaches have been implemented with little regard for effectiveness, long-term viability, or alignment with other types of analytics that are used elsewhere in the organization. This too threatens the success of the project.

So it is essential that any high-level learning analytics strategy focus on both the academic and the technical side. Any strategy should include the following steps:

- Understand the major academic or business challenges facing your institution that need to be or potentially could be addressed using learning analytics.
- Identify all the stakeholders in a learning analytics project at your institution and pull representatives of these groups together into a strategic planning and governance group to develop a plan and guide action.

- Identify what data you have on campus and who owns the data. Make sure that your data are clean and that you have shared common definitions.
- Identify the inhibitors to making progress on learning analytics and to action based on learning analytics on your campus. Be cognizant of these inhibitors, call them out in your strategic plan, and work to overcome them. Based on the survey results, typical inhibitors to successful learning analytics include concerns about the cost and affordability of learning analytics solutions, the difficulty of keeping pace with developments in this space, concerns about the misuse of data, and challenges in working with vendors, especially with regard to transparency of the models used and to vendor lock-in. However, while consulting lists such as those developed from the ECAR survey, each institution is likely to face its own particular set of challenges and the activity of identifying these is a useful one for each institution to go through as part of the strategy development process.
- Traditionally Gartner has advised institutions that a fully fledged analytics implementation is likely to include a suite of tools rather than a single solution. For learning analytics this suite is likely to include tools such as a basic BI or reporting tool; an early-alert system to alert students, faculty, and advisors when students are at risk of failing; a predictive analytics model to find patterns in large quantities of student data identifying risk factors; and degree mapping tools to help students identify optimal paths through course requirements. These tools are used alongside more institutional analytics solutions focused on enrollment, advancement, and alumni. Many of these tools make use of integrated or third-party customer relationship management solutions to track cases and add qualitative measures. Increasingly these tools include a mobile component, either as an aspect of early alert or as a freestanding system to gauge student engagement or to prompt positive student behavior or remind them of deadlines. Some vendors are starting to aggregate a large number of these tools, thus prompting institutions to make decisions about whether to go with a single vendor or to create a suite of solutions or a hybrid of the two.
- Understand that most analytics implementations work through a hierarchy of approaches, from descriptive analytics to diagnostic analytics, to predictive, to prescriptive. Start by developing a descriptive approach and build to more diagnostic and predictive approaches.
- Scan the learning analytics environment to examine what other institutions have done with regard to problems they have chosen to address, technologies they are using, and ways that they are choosing to address the problems identified. At the same time, scan the market for learning analytics solutions as well as business intelligence solutions that can be adapted to learning analytics needs.

- Develop a high-level analytics strategic plan; this should include making the business case for why your institution should be pursuing learning analytics, as this will be crucial to securing executive buy-in and funding.
- Socialize the plan with campus stakeholder groups before implementation and keep communicating with these groups about the progress of the project.
- Start small and build your analytics efforts. By using semiautomated approaches, an institution may be able to better understand the functionality needed before purchasing a system.

The Future of Learning Analytics

Thinking about the future of specific technologies is never easy, but thinking about the future of learning analytics poses some particular challenges.

- We are still in a very early stage of development with learning analytics, with regard to both the technologies themselves and our practice and understanding of learning analytics as a field. Extrapolating into the future from such a small base of knowledge is difficult, but we can ameliorate this by looking at the experiences of other industries.
- Learning analytics has three levels that look and function differently, and each has its associated stakeholders and actors. These levels are student, instructor, and administrator. (At the administrator level, you have department, college, institution, and sometimes even a professional body for accreditation.) The way learning analytics practices and technologies will evolve and develop will vary by level, so we need to think about what the future means for each of these.
- Given the way that learning analytics affects student learning and faculty instruction and autonomy, it is a difficult and politically fraught area. These sensitivities will affect the way learning analytics as a field changes and progresses. At the very least, it will make change slower.

Despite the challenges, Gartner predicts that learning analytics will change in five major dimensions over the medium to long term (3–5 years). These predictions are based on analyzing changes in the current market for analytics solutions, by closely following the strategies of learning analytics early adopter institutions, and by looking to the experiences of data and analytics in other industries, especially retail, where the adoption of analytics solutions is more advanced.

- Learning analytics technologies currently rely quite heavily on human intervention at the data-gathering and analysis stage and on relatively limited sources of data. In the future we will see increasing automation of learning analytics, data capture, reporting, and even ameliorative action in response to problems identified by the data. We will also see data from a greater variety of sources being used within learning analytics applications.
- As our data-capture abilities improve in learning analytics, and as the implications of these data—and especially the combination of different data sources—become obvious, we will see more attention being paid to the privacy and ethical aspects of learning analytics in terms of both evolution and practice; these considerations will be increasingly built into learning analytics technologies as a default.

- The future of learning analytics will be shaped by battles about openness, especially about access to the core algorithms in predictive systems. As is reflected in some of the survey responses, the current trend of having black-box algorithms in analytics tools is a source of concern for many higher education CIOs. We predict that open analytics platforms that are modularized and extensible through open APIs are likely to dominate the future of analytics.
- Future learning analytics will rely more heavily on and feed into cross-institutional repositories of analytics data in order to create a more robust benchmarking and predictive process.
- Future learning analytics will emphasize more advanced and personalized dashboards for students and instructors that will allow them to reflect on not just grades and other kinds of raw data but also on more qualitative insights such as how the content of their work (or in the case of instructors, on the work of the class) scores on meta kinds of competencies such as verbal communication, teamwork, critical thinking, or creativity. Learning analytics tools will also show knowledge or content relationships between different courses or parts of courses and use social network analysis to show students' performance on a range of different measures, not just grades, relative to the rest of the class or group.

Learning analytics as a field and as a set of technologies will continue to lag institutional analytics, which is less politically charged, easier to relate to measurable outcomes such as cost savings, and an easier environment from which to borrow analytics and business intelligence insights from other fields and industries.

Recommendations

- **Assess culture and climate.** Establish where your institution stands currently in regard to learning analytics. Evaluate the policies, procedures, and structures that are in place and that do or can support initial or increased use of analytics. Take note of key stakeholders who may be able to act as champions and increase buy-in. Embedding learning analytics as a formal part of an institutional process can increase overall implementation success.
- **Involve leadership and varied constituents.** Success of learning analytics adoption requires strong leadership support and involvement from the beginning. Leaders should establish a sense of urgency behind the initiatives. Form a collaborative and diverse team to drive implementation and use initiatives. It is helpful to include participants from academic and administrative leadership, IT, and IR as a core part of the team. Clarify needs, goals, ownership, and scope early.
- **Target initial efforts for early wins.** You can increase buy-in by establishing early goals around a specific need or question and using learning analytics to help solve it. A successful culture of evidence will garner vocal support from key stakeholders who see early returns on learning analytics adoption. Since student success, particularly student retention, is a current focus for many institutions and aligns well with learning analytics, it would be a sensible area to target for the initial gains.
- **Recognize that data governance is key.** Proactively establish processes, policies, and documentation around learning analytics, including data and infrastructure. The more questions you can answer on the front end and the higher the data quality, the more confidence you can build for implementation and adoption of learning analytics. Data governance should involve both IT and IR, and you should work with functional areas to understand their structures, data, and processes. Involving the functional areas from the start provides the opportunity for wider involvement and support.
- **Measure and continually reassess student success maturity.** Look for opportunities for improvement in each of the dimensions of the student success maturity index. In appendix B, we identify possible actions informed by the student success maturity results explored earlier. As always, of course, what is typical overall may not apply at a given institution, and we advise that each institution assess its student success maturity in detail in order to better understand how it compares with broader patterns.

- **Conduct regular outcomes assessment.** Establish metrics tied to the questions you want to answer. What does success look like? Analytics is an ongoing initiative and not a one-time event. Support the continuous use of learning analytics by regularly reviewing where you stand internally and identifying the actual outcomes expected from use. Establish regular and formal formative and summative reviews of learning analytics efforts.

Methodology

The 2015 analytics survey was administered to a sample of EDUCAUSE member institutions (N = 245, response rate 13%). Tables A and B summarize respondents' Carnegie class and institution size distributions. The survey contained both qualitative and quantitative items. Data collection occurred between May 12 and June 7, 2015.

In addition to the survey, data were collected from six focus groups conducted at the EDUCAUSE/NACUBO 2015 Administrative IT Summit in Seattle, Washington, in June 2015. Participants included leaders and professionals from IT, IR, dedicated analytics units, and business and finance. Additional data sources included are the 2014 EDUCAUSE Core Data Service and Gartner's cross-industry analysis of the state of analytics.

Table A. Respondent Carnegie class distribution

Carnegie Class	Frequency	Percentage
AA	29	12%
BA	49	20%
MA Public	23	9%
MA Private	33	13%
DR Public	40	16%
DR Private	19	8%
Other	24	10%
Non-U.S.	28	11%

Table B. Respondent FTE enrollment size distribution

Size	Frequency	Percentage
Less than 2,000	40	16%
2,000–3,999	57	23%
4,000–7,999	40	16%
8,000–14,999	32	13%
15,000+	39	16%
Unknown	37	15%

Acknowledgments

EDUCAUSE expresses its gratitude to institutions and focus group members who contributed to our 2015 analytics study. The study also benefited from the contributions of our subject-matter expert panel, who assisted with study design and with valuable comments and suggestions: **John Campbell** (West Virginia University), **Vince Kellen** (University of Kentucky), **Steve Lon** (University of Michigan–Ann Arbor), **Andrea Nixon** (Carleton College), **Jeff Schram** (Missouri University of Science and Technology), and **Celeste Schwartz** (Montgomery County Community College). **Kathryn Northcut** (Missouri University of Science and Technology) conducted analysis of focus group responses. The analytics study design and survey development were carried out by **Jacqueline Bichsel** of EDUCAUSE. Also from EDUCAUSE, **Susan Grajek, Eden Dahlstrom, D. Christopher Brooks, Jamie Reeves**, and **Gregory Dobbin** reviewed content and contributed many helpful suggestions, and **Kate Roesch** designed and created the report graphics.

Notes

1. Kelly J. Calhoun, Jan-Martin Lowendahl, Terri-Lynn B. Thayer, and Glenda Morgan, *Predicts 2016: Building the Foundation for the Digitalization of Education* (Stamford, CT: Gartner, November 2015), available from https://www.gartner.com/doc/3168818/predicts--building-foundation-digitalization.
2. See https://tekri.athabascau.ca/analytics.
3. Aisha Labi, "Placing Student Success at the Center of State Higher Education Finance Policy," Lumina Foundation, November 2015.
4. Bror Saxberg, "Why We Need Learning Engineers," *Chronicle of Higher Education*, April 20, 2015.
5. National Conference of State Legislatures, *Performance-Based Funding for Higher Education*, July 31, 2015.
6. Peter Ewell, *The Changing Ecology of Higher Education and Its Impact on Accreditation* (Alameda, CA: Western Association of Schools and Colleges, January 2013).
7. National Conference of State Legislatures, *Performance-Based Funding*.
8. The Institute for College Access and Success, *Student Debt and the Class of 2014*, October 2015.
9. Hart Research Associates, *Falling Short? College Learning and Career Success* (Washington, DC: Association of American Colleges and Universities, 2015).
10. D. Christopher Brooks, *IPAS Evaluation and Assessment Guide*, research report (Louisville, CO: ECAR, May 2015).
11. Yanosky, Ronald, with Pam Arroway, *The Analytics Landscape in Higher Education, 2015* (Louisville, CO: ECAR, October 2015), available from the Analytics in Higher Education, 2015 Research Hub.
12. Yanosky and Arroway, *The Analytics Landscape*, 2015.
13. D. Christopher Brooks, with a foreword by John O'Brien, *ECAR Study of Faculty and Information Technology, 2015*, research report (Louisville, CO: ECAR, October 2015), available from http://www.educause.edu/ecar.
14. Yanosky and Arroway, *The Analytics Landscape*, 2015.
15. EDUCAUSE Core Data Service.
16. Grajek, Susan, *Trend Watch 2016,* research report (Louisville, CO: ECAR, forthcoming). Available from http://www.educause.edu/ecar.
17. Yanosky and Arroway, *The Analytics Landscape*, 2015.
18. Neil Chandler, *2015 ASPIRE: A Framework for Analytics Business Processes* (Stamford CT: Gartner, February 2015), available from https://www.gartner.com/doc/2995119/aspire-framework-analytic-business-processes.

Appendix A

Approaches to Improving Analytics Maturity

- Take advantage of existing analytics staff skill sets and tools, and have a senior-level IR lead involved in the planning for high-level strategic initiatives or questions.
- Have analytics tools and software with the capacity to store, manage, connect, and analyze data, and interact with stakeholders.
- Strengthen change-management practices and incorporate data review formally into decision-making processes.
- Identify pockets of individuals, particularly faculty, who are unconvinced and target examples to questions or problems that directly affect them.
- Fortify policies and practices by creating mechanisms to communicate analytics plans, goals, and achievements to major constituents.
- Work on improving data standardization; develop processes to eliminate, phase out, or update data and reports that are no longer valuable; and enhance user access to data with self-service tools such as dashboards or portals.
- Make the case for investment by using analytics on itself. Demonstrate through examples, even if their scope is limited, that analytics is an investment with real potential for return.

Appendix B

Approaches to Improving Student Success Maturity

Leadership and Governance

To address problems typical of the leadership and governance dimension:

- If you don't have a committee to help stakeholders such as faculty, academic leadership, IT, and students contribute to decisions about student success, consider creating one. If you have such a body and it isn't as effective as you wish, try raising its profile by appointing new members, sharpening its charge and powers, or aiding it with staff resources.
- Look for new sources to fund student success efforts, or reappraise your goals to see if they need to be aligned with available resources. Focusing resources on a modest but achievable near-term goal could help make the case for greater priority and investment.

Student Success Collaboration and Involvement

To help improve your capabilities in student success collaboration and involvement:

- Encourage people from different departments to articulate their needs and improve their understanding of the overall student success effort.
- Be sure that student success initiatives identify their scope and goals. Seek a common understanding of what success looks like.
- Don't treat student success goals as if they are only the concern of leadership or a small team. Make sure everyone knows what the goals are and understands that achieving them is a common endeavor.

Advising and Student Support

To enhance advising and student support maturity:

- It may be necessary to be more proactive about identifying students at risk and reaching out to them. Analytics resources and education planning systems can help by uncovering patterns and improving the flow of information.
- Focus on faculty adoption of both systems and goals with open communication, ideally beginning before initiatives are implemented. Address fears that student success programs or systems might usurp faculty roles or add unreasonably to workloads.

Process and Policy

Institutions seeking to address weaknesses in this area should:

- Review information security policies and practices for appropriate application to student success data.
- Specify role-appropriate privileges and responsibilities for accessing institutional or individual student success data.
- Measure the effectiveness of student success initiatives and periodically reassess the ways in which they are delivered and governed.

Information Systems

Action items for improvement in the information systems dimension:

- Develop your institution's understanding of the emerging marketplace in student success technologies, particularly in the areas of advising, education planning, and risk identification.
- Where your institution has technology deficits, work with the office of the president, student affairs, academic affairs, and the student success elements of your institution to prioritize student success concerns and incorporate them into your IT strategic plan.
- Review current systems for their ability to provide a complete view of information needed by students and advisors to evaluate academic programs and track progress.
- Invest in data integration initiatives that improve the ability of success-related systems to share data with one another.

Student Success Analytics

To address issues typically found in student success analytics maturity:

- Consider whether you are collecting the right kinds of data to support your outcomes and analytics needs. Enterprise systems designed for transactional purposes may have to be modified or supplemented to capture analytics data.
- Measure the performance of student success initiatives and regularly reassess methods and processes to see how they can be improved.
- Consider enhancing staff analytical expertise in predictive analysis and/or adopting external analytics services.
- Create forums for faculty and advisors to learn about analytics capabilities and exchange ideas about applying them. Identify individuals who might be evangelists for effective use of analytics to help students.