

Roadmap

TOOLS FOR NAVIGATING COMPLEX DECISIONS

Academic Analytics: The Uses of Management Information and Technology in Higher Education

Philip J. Goldstein, Fellow, EDUCAUSE Center for Applied Research

KEY FINDINGS

- ▶ Most respondents rely on a transaction processing system as the primary platform to support their needs for information and analysis.
- ▶ The use of academic analytics varies by functional area. The most sophisticated and active users are central finance, institutional research, admissions, and central planning and budgeting.
- ▶ Most respondents use academic analytics primarily to support transactional and operational reporting. Few have extensively adopted advanced applications such as what-if analysis, predictive modeling, scenario building, or automated alerts.
- ▶ Responding institutions are using advanced applications of academic analytics most frequently in student services and least frequently in grants management.
- ▶ Respondents report benefiting the most from their use of academic analytics to improve student recruitment and retention.
- ▶ Success with academic analytics is strongly associated with leadership commitment to evidence-based decision making, training effectiveness, and staff analytical skill.
- ▶ The majority of respondents anticipate expanding their capacity to perform academic analytics in the next two years.

The complexity of assessment and outcomes measurement, the demand for information from boards and accrediting bodies, and the increased velocity of decision making are driving the need for more information and better tools to analyze it. Historical technology investments have improved the ability to capture data, but are institutions able to distribute and analyze it? Is information being used in decision making, or do leaders still rely primarily on instinct? What factors differentiate institutions that are successful at using information in their decision making, and what benefits are they realizing?

The EDUCAUSE Center for Applied Research (ECAR) study *Academic Analytics: The Uses of Management Information and Technology in Higher Education* examines each of these questions. The study and the term "academic analytics" are intentionally broad. From a technology perspective, the study includes the use of transaction systems, operational data stores, data marts, and data warehouses as platforms for reporting and analysis. Academic analytics also includes a range of applications of technology including transaction-level and operational reporting, data mining and extraction, what-if analysis, predictive modeling, and automated triggers of business processes.

Overall, the study finds that responding institutions are, for the most part, in the early stages of adopting academic analytics. Most respondents rely exclusively on transaction systems to support academic analytics and use it primarily to support

This ECAR roadmap synthesizes the results from a survey of 378 institutions and qualitative interviews with 27 individual executives from higher education and corporate providers of academic analytic solutions. The roadmap summarizes the 2005 ECAR study Academic Analytics: The Use of Management Information and Technology in Higher Education by Philip J. Goldstein with Richard N. Katz. To order the full study or to learn about subscribing to ECAR, visit the ECAR Web site at <http://www.educause.edu/ecar> or contact us at ecar@educause.edu.

KEY REPORT CONCEPTS

- ▶ Academic analytics refers to an institution's use of information and technology to support its management and decision making.
- ▶ The term encompasses a variety of activities including reporting, predictive modeling, what-if analysis, and the use of information to automatically trigger a business process.
- ▶ Academic analytics includes the use of data to support all aspects of institutional management including finance, enrollment management, and academic administration.

transactional and operational reporting. While less common, more advanced uses of analytics appear to be having a significant impact in individual functional areas. This is especially true in efforts to improve student recruitment and retention.

Management climate appears to play a significant role in an institution's ability to use academic analytics in advanced ways. Respondents who report that they more frequently use academic analytics in more advanced ways also characterize their leadership cadre as committed to information-driven decision making. In addition, these institutions have more effective user training programs and deeper analytical skills among their staffs.

Choice of Technology Platform

Nearly half of the survey respondents rely primarily on their transaction systems to support their reporting needs. The remainder employ a combination of technologies. In fact, we found that respondents' technologies were distributed among three primary technology levels. These are:

- ▶ Level 1—Transaction system
- ▶ Level 2—Operational data store or single data mart used in conjunction with an extract, transform, and load (ETL) tool
- ▶ Level 3—Enterprise data warehouse and/or multiple data marts used in conjunction with an ETL tool, online analytical processing tools (OLAP), or executive dashboards

We found 47 percent of respondents to be at level 1, 9 percent to be at level 2, and 14 percent to be at level 3. The remaining respondents appear to be in transition between levels. Many indicated they were in the process of implementing components such as an ETL tool or OLAP that would enable them to move from level 1 to 2 or from level 2 to 3.

The choice of technology platform impacts an institution's satisfaction with the tools themselves. Institutions with technology capability beyond level 1 were more satis-

fied with their ability to provide users with timely access to information, to make information widely accessible, and to provide easy-to-use tools. Respondents with level 3 technology platforms were the most satisfied with their ability to provide easy access to timely information.

Advanced Academic Analytics—Student Services Leads the Way

Respondents report varying intensity and sophistication of use of academic analytics across functional areas within their institutions. Among the most active users of academic analytics are central finance, planning and budgeting, admissions, and institutional research. Among the least active users are human resources, advancement, and research administration.

The student services functions and processes are reported to be among the most advanced users of academic analytics. Respondents report using their academic analytics technologies to perform advanced analyses such as predictive modeling or to automatically trigger business processes both in enrollment processes and in support of improved student retention. For example, nearly 45 percent of respondents report using academic analytics usually or almost always to identify students that may be at academic risk, and 28.9 percent use their analytical technology to automatically alert an appropriate official when an academic intervention is necessary.

Although less frequent, there are examples of advanced academic analytics being used in other functional areas as well. For example, one-third of respondents report that they sometimes or usually use their analytical capability to identify potential donors. Similarly, in the finance area, 22.1 percent of respondents generate automated alerts to appropriate officials when a financial indicator falls outside a desired range.

It is in the student areas, however, where institutions report the greatest impact. We asked respondents to evalu-

METHODOLOGY

- ▣ A literature review on business intelligence, competitive intelligence, evidence-based decision making, and data warehousing
- ▣ A quantitative survey of 378 EDUCAUSE member higher education institutions
- ▣ Qualitative telephone interviews with 25 higher education IT managers and 2 corporate leaders
- ▣ Two case studies

Table 1. Improved Outcomes from Academic Analytics, by Function (N=354)

Outcome	Mean	Std. Deviation
Improved the institution's financial results	3.09	0.928
Managed its workforce more productively	2.78	0.928
Managed grants effectively	2.61	0.984
Improved ability to obtain grant funding	2.47	0.962
Improved admissions/enrollment management results	3.43	1.012
Improved fundraising results	2.93	1.087
Improved student retention results	3.16	0.952

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

ate the successes they were achieving through their use of academic analytics. Using a five-point scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree), respondents indicated the extent to which academic analytics was helping them improve performance across several business process areas. As Table 1 illustrates, the two highest-ranked outcomes were improving student retention results and improving admissions results.

Leadership and Skills Matter

There is a strong relationship between several attributes of a respondent's management climate and the successful use of academic analytics. First, institutions with leaders who are committed to evidence-based decision making report significantly better outcomes. Similarly, institutions with staff that are skilled at analysis and those who consistently provide effective training also achieve better outcomes.

Interestingly, we did not find a significant relationship between an institution's choice of technology platform and its success. This is not to suggest technology choices do not matter. Institutions with more extensive technol-

ogy platforms do report more ease in accessing data and moving it around the institution. The lack of extensive technology in and of itself is not a barrier to successful academic analytics, nor is the presence of extensive technology a guaranteed predictor of success. Success instead is a byproduct of the alignment of the right amount of technology, strong staff skills, and clear, consistent commitment of leadership.

Only the Beginning

It is likely that we are still in the early stages of higher education's adoption of academic analytics. Regardless of their current capability, the majority of respondents indicated that they plan to significantly expand their capacity in the next two years. Most also expect that their users' demands for more information and analytical capability will grow, stimulated by increasing competition and regulatory oversight and by mounting pressures for accountability and outcome measures. The initial results that institutions are achieving in their efforts to use information to improve enrollment and retention results create a compelling case to invest in expanding both technical capacity and staff analytical skills.

RECOMMENDATIONS

Based on its findings in *Academic Analytics: The Uses of Management Information and Technology in Higher Education*, ECAR offers the following recommendations:

1. Develop analytical skills within the institution.

Institutions with staff who are skilled at analysis are achieving better returns on their investments in the technology that supports academic analytics. Training in the use of technology tools is only a small part of the solution. Staff members need to understand the definitions of the underlying data. They need to see the relationships among the business problems they are solving, the analytical questions that need to be answered, and the data that are available to answer them.

2. Model desired behavior among key leaders.

As with any change, staff will follow the examples of their leaders. If executives are not committed to asking for and using data to make decisions, then neither will their staffs. In a culture that does not value evidence-based decision making, staff will not spend the time to develop and apply their analytical skills.

3. Deploy technology judiciously.

Institutions without extensive technology platforms can achieve advanced applications of academic analytics in some areas and do achieve positive outcomes. However, the effort required to achieve these results is significant. Incremental increases in additional technology capability can make a difference. The cost of developing a good technology infrastructure for academic analytics should be within the reach of the majority of institutions.

4. Find partners and prove the concept.

Most implementations of academic analytics are initiated first by the information technology department. IT often needs to demonstrate a capability before users can envision how it will help them. Successful projects, however, require a strong partnership between a functional sponsor and an information technology sponsor.