7
Advanced Applications of Academic Analytics

Analysis as an instrument of enlightenment and civilization is good, in so far as it shatters absurd convictions, acts as a solvent upon natural prejudices, and undermines authority; good, in other words, in that it sets free, refines, humanizes, makes slaves ripe for freedom. But it is bad, very bad, in so far as it stands in the way of action, cannot shape the vital forces, maims life at its roots. Analysis can be a very unappetizing affair, as much so as death.

—Thomas Mann, German author and Nobel Prize winner

As discussed in Chapter 6, most institutions use their analytical capacity primarily to report transactions or to monitor operational performance. Relatively fewer institutions use their academic analytics for advanced applications such as scenario building, predictive modeling, or automated alerts that integrate information with their business processes. In all, only 8 percent of respondents reported that their *primary* institutional use is one of these advanced applications.

While this group of respondents is relatively small, they potentially represent the way many institutions will be using their academic analytical tools in the future. So, we wanted to understand in more detail who these respondents are and how they are using academic analytics. This chapter analyzes the advanced use of analytics at the institutional level and by functional area. Specifically, we look at how institutional characteristics, management climate and culture, and technology platforms impact advanced use.

Key Findings

- Only 30 respondents report that their institution's primary use of academic analytics is for what-if analysis, scenario building, predictive modeling, or alerts.
- Advanced uses of academic analytics are more prevalent within a functional area.
- Respondents report advanced applications of analytics most frequently in finance and student services and least frequently in grants management and advancement.
- Differences in respondents' institutional missions and profiles, such as control, Carnegie class, and enrollment, impact in which areas they pursue advanced analytics.
- It appears that institutions that are more tuition driven use their analytical capabilities more frequently to support student retention.
- Having staff skilled at analysis is a critical characteristic of respondents with advanced applications of academic analytics.
- Other important factors include leadership committed to evidence-based decision making, effective training, and a stable or dynamic institutional environment.
- There is not a significant relationship between a respondent's choice of technology platform for academic analytics and their ability to implement advanced applications.

Profile of Advanced Users

This section examines the factors differentiating respondents who indicated that their institutions are advanced users of academic analytics. These respondents told us that their institution's primary use of academic analytics was for what-if analysis, scenario building, predictive modeling, or generation of automated alerts.

Institutional Characteristics

In considering the institutional profile of respondents with advanced academic analytics applications, we examined several items, including institutional control, enrollment, Carnegie class, aggregate spending on academic analytics, and the length of time since the institution first implemented its analytical capability. As Table 7-1 illustrates, we found the following characteristics:

- 42.9 percent began implementing their academic analytical capability between six and eight years ago;
- 58.3 percent report spending less than $400,000 on academic analytics over the past five years;
- nearly half (48.2 percent) have enrollments of fewer than 4,000 students;
- respondents are distributed fairly evenly across all Carnegie classes; and
- nearly two-thirds (62.1 percent) are public institutions.

Additional comments on these findings:

- The higher proportion of public institutions with advanced capability is not altogether surprising, given that more

Table 7-1. Institutional Characteristics of Respondents with Advanced Academic Analytics (N = 30)

Time Since Initial Implementation	Less than 1–2 years	3–5 years	6–8 years	9 or more years	
Institutions with Advanced Application	7.1%	21.4%	42.9%	28.6%	
Aggregate Five-Year Spending	**Less than $100,000**	**$100,000 to $399,999**	**$400,000 to $1.99 million**	**$1.2 million to $2 million**	**More than $2 million**
Institutions with Advanced Application	33.3%	25.0%	16.7%	8.3%	16.7%
FTE Enrollment	**1–2,000**	**2,001–4,000**	**4,001–8,000**	**8,001–15,000**	**15,001–25,000**	**More than 25,000**
Institutions with Advanced Application	24.1%	24.1%	17.2%	13.8%	13.8%	6.9%
Carnegie Class	**DR**	**MA**	**BA**	**AA**	**Other**
Institutions with Advanced Application	20.0%	16.7%	23.3%	20.0%	20.0%
Control	**Private**	**Public**			
Institutions with Advanced Application	37.9%	62.1%			

of the survey respondents (56.7 percent) were public institutions.

- The aggregate spending by respondents was for the past five years only. This likely does not reflect respondents' total spending to create their academic analytic capability, as nearly half began their implementation six to eight years ago or longer.
- The distribution of respondents by Carnegie class does not mirror the distribution of overall survey respondents. A smaller percentage of doctoral institutions report advanced capabilities (20 percent) than are present in the overall survey population (28.6 percent). Conversely, associate's institutions constitute a larger percentage (20 percent) than are present in the overall survey population (15.1 percent).

Among respondents, the advanced use of academic analytics happens at both small and large institutions. Often, we think of advanced technology uses only being within the grasp of larger institutions with greater resources. At least among the survey respondents, this does not appear to be the case. Of course, the relatively small number of respondents makes it impossible to conclude with certainty that the same trends would hold for all institutions.

Management Climate

To further understand the patterns of advanced uses of academic analytics, we also examined several different dimensions of respondents' management climate. We asked respondents to describe their institutions in terms of degree of decentralization, commitment to data-driven decision making, and the relative turbulence of the campus environment. We observed the following characteristics among respondents:

- A greater proportion of respondents with stable or dynamic environments had advanced applications of their academic analytical capability than did those with either volatile or unstable environments.[1] In fact, 90 percent of respondents who reported advanced uses also reported stable or dynamic environments. Comparatively, 83.1 percent of all respondents reported that their institutional environments were stable or dynamic.
- Managerial control at the majority of institutions with advanced academic analytics applications was fairly evenly distributed among those that were somewhat decentralized, balanced (between centralization and decentralization), and somewhat decentralized. This approximated the distribution of respondents' managerial control as a whole.
- Nearly 50 percent of respondents with advanced academic analytics applications agreed or strongly agreed that administrative staff at their institutions were skilled at analyzing data.
- Seventy percent of respondents with advanced academic analytics applications also agreed or strongly agreed that their institution's leadership is committed to evidence-based decision making.

Again, the relatively small number of respondents makes it difficult to reach any firm conclusions regarding the management climate of institutions with advanced academic analytics uses. While we found no statistically significant relationship between many of the management climate factors and the advanced use of academic analytics, this absence could be attributable to the small number of responses. The strongest apparent relationship is between the advanced use of analytics and administrative staff being skilled at analyzing data.

The presence of staff members skilled in analysis appears to be a significant differentiator of respondents with advanced uses of their analytical capacity. This relationship makes sense. What-if analysis, predictive modeling, and scenario building

require staff skill sets beyond knowing how to use technology tools. Users must have a deep understanding of their data and more advanced analytical skills. Ted Bross, associate director of administrative information systems at Princeton University, tells us that his institution is focusing much training and professional development on this issue. "I think the biggest bang for us is for people to get comfortable with their own data. I don't think that people understand what it is that they have." Bross continues, "I believe that most of the reporting done at Princeton is used for operational or tactical purposes. I hope as people get comfortable with this, they will build their own set of reports and make some strategic use of it." Clearly, he believes his institution must become more skilled at analysis before it can become an advanced user of academic analytics.

Interestingly, respondents with advanced uses of academic analytics at the institutional level did not have a significantly different assessment of their training programs than other respondents. We compared both groups' mean responses to two statements about their training. The first asked about the effectiveness of their training programs. The second asked if they certified users' knowledge before granting them access to systems. Respondents were asked to assess both using a five-point scale. Table 7-2 illustrates the mean responses of both groups.

On average, both groups evaluated their training effectiveness very similarly. In fact, the advanced users had a slightly lower average assessment of the effectiveness of their training and user certification programs. However, these differences were so small they were insignificant.

These results suggest that institutions that are advanced academic analytics users did not build their staff skills through training. It is possible that the more advanced users were even tougher graders of their training programs than the rest of the survey population. Or, it may be that their staff's analytical skills enabling them to be advanced users were already present at the institution prior to the advanced analytics implementation.

Chris Laidlaw, director of administrative information systems at Williams College, reports that strong analytical skills are a by-product of how his institution managed reporting in their pre-ERP legacy system. "We already had a great structure and strength in place for user reporting. In our legacy system, we had a person in each major administrative area who used FOCUS to do their local reporting. The users had strong analytical skills and they are still here. IT worked with them to learn the relational database world."

So, many early adopters of advanced analytics may have leveraged dedicated staff positions and in-house analysis skill sets. The depth of their analytical skills may have enabled them to quickly learn new tools and move to more advanced uses of academic analytics. For the majority of institutions, the challenge will be to create similar knowledge in their existing staff through training.

Technology Platform

Lastly, we looked at the type of technol-

Table 7-2. Advanced Applications of Academic Analytics and the Effectiveness of Training

Primary Use	Provide Effective Training (N = 372)	Certify That Users Understand the Data (N = 368)
Transaction or operational reporting	2.80	2.39
What-if modeling, or alerts	2.73	2.10

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

ogy platform used by institutions reporting that their primary use of academic analytics is for what-if analysis, predictive modeling, or alerts. Somewhat surprisingly, nearly half of the respondents with advanced applications report that they primarily use their transaction system for reporting and analysis. The next largest percentage (26.7 percent) reported having multiple data marts.

One would expect that a majority of respondents with advanced uses of academic analytics would have invested in a data warehouse or possibly one or more data marts. As in the prior categories, we caution the reader not to conclude that advanced applications do not require additional technology capability. First, the small numbers of respondents make it difficult to draw any firm conclusions from the data. Second, significant variability in how institutions defined the uses of their academic analytics may have impacted the responses. More than half the respondents who report having advanced applications did so because they used the information in their analytical systems to automatically trigger alerts or business processes. It is possible that some respondents chose this capability level because they interpreted automatic triggers to be equivalent to the business process workflow capability in their ERP systems. This would in part explain the relatively large number of respondents with only transaction system reporting.

Using the technology platform levels described in Chapter 5, we see a similar result. As Figure 7-1 shows, half of respondents with advanced uses reported level 1 capability (transaction system reporting).

Again, the relatively large proportion of respondents with level 1 technology platforms and advanced academic analytics applications is striking. Our hypothesis was that institutions with advanced uses of their analytical capacity would also have more complex technology platforms to support it. It is possible that there is not a strong link between a sophisticated technology platform and its sophisticated application. It is possible that sophisticated analytics depends more on training, staff skills, and management culture. Finally, re-

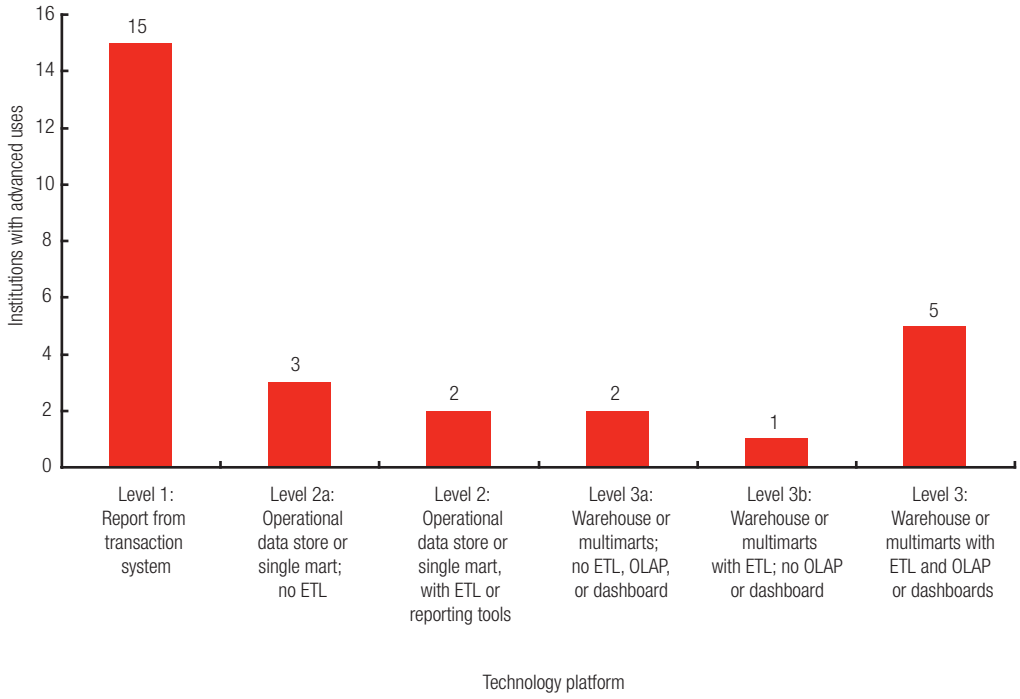


Figure 7-1. Number of Respondents with Advanced Uses, by Technology Platform

spondents may have interpreted differently what defines a level 1 technology platform. Some may have advanced warehouses and analytical tools purchased from their ERP vendor and integrated with their transaction system. This would not be an unusual technology platform for an institution to use to support its analytical needs. It is possible that some respondents with this technology configuration consider themselves to have a level 1 technology platform.

Advanced Applications by Functional Area

To further understand how institutions use their academic analytical capabilities, we looked at advanced uses by functional area. We asked respondents to agree or disagree with a series of statements regarding the advanced application of their analytical capacity in the following functional areas:

- finance,
- grants management,
- student services, and
- advancement.

Looking at particular functional areas helps us to analyze the characteristics of institutions that have made significant progress in targeted areas. In contrast, the group of respondents discussed in the prior section indicated that they were advanced users at the institutional level. While we expect some overlap in the composition of these two groups, we anticipate that there will be more respondents that are advanced users in a particular function than at the institutional level.

Finance

We asked respondents about two applications of their academic analytics capability in the finance area. First, we asked if they monitored operational performance such as budgeted expenditures versus actual expenditures. Second, we asked if they automatically alert appropriate officials when a financial indicator falls outside a desired range. Institutions were asked to respond using a five-point scale (1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always). The first statement represents a stage 1 or 2 application of academic analytics. The second is an example of a more advanced academic analytics application (stage 5).

As anticipated, more respondents monitor operational financial performance than generate automatic alerts tied to financial indicators. The majority of respondents (57.4 percent) agreed that they sometimes or usually (mean 3.65) use their academic analytics to monitor operational financial performance. Comparatively, the mean response for use to generate automated alerts was 2.37. Fewer than a quarter of respondents (22.1 percent) said that they usually or almost always generate automatic alerts.

We then examined the profile of those respondents that indicated they usually or almost always use an advanced academic analytics application (in this case, alerts) in the finance area. Once again, we looked at institutional characteristics, management climate, and technology. Among institutional characteristics, only one factor appears to be a significant differentiator of institutions that have advanced applications.

We found a significant relationship between the length of time an institution has had their analytical capability and the likelihood that they frequently use it to generate automatic financial alerts. As Table 7-3 illustrates, the longer a respondent has had their academic analytical capability, the greater their agreement that they use it to generate financial alerts. Institutional control, enrollment, and Carnegie class did not appear to be significant differentiators. This supports our earlier observation that institutions must become more familiar with their data before they can embrace an advanced use such as

Table 7-3. Use of Automatic Alerts for Financial Indicators, by Time with Advanced Analytics (N = 204)

Time	Mean	N	Std. Deviation
Less than 1–2 years	2.00	48	1.255
3–5 years	2.11	66	1.139
6–8 years	2.53	43	1.386
9 years or more	2.62	47	1.407
Average/Total	**2.29**	**204**	**1.302**

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

incorporating alerts into business processes.

As one would expect, a respondent's management climate does appear to have an impact on advanced use of academic analytics in the finance area. We found a relationship between several characteristics of climate and the advanced use of academic analytics for finance (to generate alerts). The effectiveness of training, the analytical skills of administrative staff, and the institutional commitment to evidenced-based decision making are all positively correlated with the frequency with which an institution uses its analytical capability to generate automated alerts for finance.

Leadership is an important component to adoption of more advanced analytics in the finance area. Regan Ramsower, CIO and interim chief financial officer at Baylor University, explains how his role in finance has enabled him to encourage adoption of academic analytics. As CFO, Ramsower created a modeling tool to develop and process funding requests for new initiatives. Ramsower says, "It is a requesting system that has the multiyear costs broken down by various areas. It uses workflow to automatically route the request through affected areas before it comes to finance for a decision. The requestor gains knowledge along the way and can constantly reassess whether the project is worth it." Ramsower now approves all requests through this system.

In addition to the importance of leadership, we found a relationship between the stability of the campus environment and the use of advanced analytics for finance. Similarly, respondents with more centralized management control also were more likely to generate automated alerts for financial indicators (see Table 7-4).

As Table 7-4 illustrates, institutions with stable or dynamic climates also report using their analytics to generate alerts more frequently than institutions with volatile or unstable cultures.

There appears to be no significant relationship between the advanced application of academic analytics in the finance area and the technology platform the institution uses. As we saw in our analysis of respondents with advanced analytics applications at the institutional level, respondents who generate financial alerts do so with various technology platforms. Among the 81 respondents who usually or almost always generate finance alerts, the greatest number (45.6 percent) generate reports directly from their transaction system. The next most common technology platforms were multiple data marts (24.7 percent) and a single data warehouse (16 percent).

Grants Management

In the grants management area, we sought to learn the extent to which institutions use their academic analytics capability to sup-

Table 7-4. Use of Automatic Alerts for Financial Indicators, by Managerial Control and Institutional Environment (N = 367)

Managerial Control	Mean	Institutional Environment	Mean
Very decentralized	1.93	Stable	2.45
Somewhat decentralized	2.05	Dynamic	2.49
Balanced	2.63	Volatile	1.90
Centralized	2.49	Unstable	1.70
Highly centralized	2.51	—	—
Average	**2.37**	**Average**	**2.37**

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

port both pre- and post-award management of research grants. Specifically, we asked about the use of automated alerts if a pre- or post-award metric falls outside a target range or to announce when a new funding opportunity becomes available. As Chapter 6 discussed, few respondents reported that their central research administration staff members are active users of advanced academic analytics of any kind. So, we would expect relatively few to be using automated alerts in this way.

In fact, this is the case. Among all respondents, fewer than 10 percent reported that they usually or almost always generate automated alerts either to monitor performance metrics or to notify appropriate officials when a new research grant becomes available. Table 7-5 summarizes the mean response to each statement.

We found that institutions with advanced analytics use in grants management had similar profiles to those with advanced use in finance. This is not surprising, given that the applications we asked about in the grants management area relate directly to the financial management of a grant. Institutional factors did not appear to be significant differentiators. While doctoral institutions reported a slightly higher mean frequency of advanced use for alerts (see Table 7-6), it was not a statistically significant difference. Institutional size and the length of time they have had their academic analytical capability also did not appear to be a significant differentiator among institutions.

As in the finance area, characteristics of the respondent's management climate do appear to be a significant differentiator. Training program effectiveness, staff analytical skills, and management's commitment to evidence-based decision making all appear to have a relationship with the advanced use of academic analytics.

Respondents with more effective training, greater staff analytical skills, and more extensive management commitment also report more frequent use of alerts for pre- and post-award grants management. We also saw a relationship between the degree of turbulence in the institutional management climate and the use of advanced analytics: Institutions with stable or dynamic climates were more frequent users of advanced analytics in grants management. This apparent relationship makes sense. ECAR's study of business process effectiveness, *Good Enough! IT Investment and Business Process Performance in Higher Education,* found grants management processes to be among the lowest-performing administrative processes and the most difficult to change

Table 7-5. Use of Automated Alerts in Grants Management (N = 352)

Use	Mean	Std. Deviation
Automatic alert when a pre-award research administration/ grants management metric falls outside a desired range	1.77	1.077
Automatic alert when a post-award research administration/ grants management metric falls outside a desired range	1.80	1.144
Automatic alert when new research grant opportunities become available	1.66	1.020

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

Table 7-6. Use of Advanced Analytics in Grants Management, by Carnegie Class

Carnegie Class	Use Alerts for Pre-Award (N = 359)	Use Alerts for Post-Award (N = 358)	Use Alerts for New Grant Opportunities (N = 356)
DR	1.90	1.95	1.86
MA	1.65	1.63	1.55
BA	1.77	1.94	1.64
AA	1.80	1.66	1.41
Other	1.75	1.77	1.75

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

(Kvavik et al., 2005, pp. 63–64). It seems hardly surprising that an institution with an unstable climate would be poorly positioned to introduce advanced analytics use in an area such as grants management that is inherently resistant to change. Table 7-7 lists the mean response to advanced analytics use in grants management by characteristics of management climate.

The advanced use of analytics in the grants area appears to have no relationship to the type of technology platform the institution uses. We found no significant difference in the use of advanced analytics for grants management between institutions with levels 1, 2, or 3 technology platforms. The same is true of institutions with near level 2 or near level 3 capability. In fact, among respondents that "usually" or "almost always" use alerts for pre-award indicators, 45.5 percent have level 1 (transaction system reporting) platforms. Among those with alerts for post-award indicators "usually" or "almost always," 33.3 percent have level 1 technology platforms.

Advancement

In the advancement (fundraising) area, we wanted to understand how institutions use data to shape and implement their fundraising strategies. We asked respondents the extent to which they use their analytical tools to identify potential donors or to tailor fundraising appeals to individuals. Fairly significant numbers of respondents do use their academic analytics to support the advancement area. One-third reported that they sometimes or almost always use their analytical capability to identify potential donors. Fewer institutions (24.2 percent) report using analytics to tailor their fundraising appeals to donors. Table 7-8 lists the average responses from institutions, using a

Table 7-7. Use of Advanced Analytics in Grants Management, by Management Climate

Characteristic	Scale	Use Alerts for Pre-Award	Use Alerts for Post-Award	Use Alerts for New Grant Opportunities
Effective Training	Almost never	1.43	1.37	1.46
	Occasionally	1.64	1.73	1.59
	Sometimes	1.74	1.67	1.60
	Usually	2.06	2.15	1.80
	Almost always	2.14	2.29	2.10
Institutional Environment	Stable	1.78	1.81	1.63
	Dynamic	1.88	1.96	1.75
	Volatile	1.40	1.37	1.51
	Unstable	1.55	1.30	1.45
Staff Highly Skilled	Strongly disagree	1.33	1.12	1.44
	Disagree	1.47	1.41	1.33
	Neutral	1.78	1.81	1.75
	Agree	2.04	2.14	1.89
	Strongly agree	2.11	2.33	1.56
Committed to Evidence-Based Decision Making	Strongly disagree	1.64	1.57	1.79
	Disagree	1.38	1.34	1.21
	Neutral	1.62	1.66	1.51
	Agree	1.80	1.82	1.73
	Strongly agree	2.40	2.51	2.16

Q: *My institution uses academic analytics to automatically alert appropriate officials when a pre-award research administration/grants management metric falls outside of a desired range.*

Q: *My institution uses academic analytics to automatically alert appropriate officials when a post-award research administration/grants management metric falls outside of a desired range.*

Q: *My institution uses academic analytics to automatically alert appropriate officials when new research grant opportunities become available.*

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always; scale applies to three questions above)

Table 7-8. Uses of Academic Analytics in Advancement (N = 355)

Use	N	Mean	Std. Deviation
Identify potential donors	361	2.78	1.271
Tailor fundraising appeals for individual donors	356	2.53	1.270

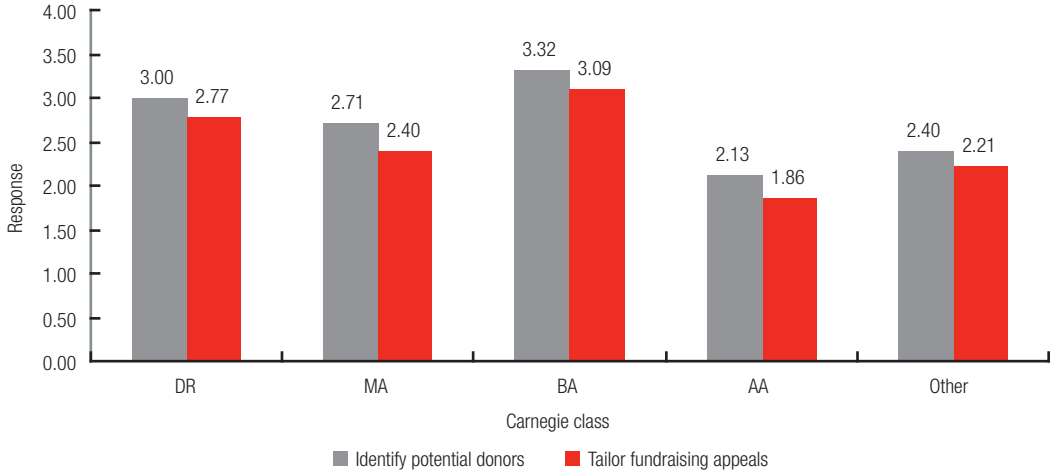
(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

five-point scale.

As expected, institutional factors play a strong role in determining a respondent's use of advanced analytics in the advancement area. One would expect only those institutions with significant fundraising operations to derive enough benefit from sophisticated data-driven fundraising strategies to warrant creating them. Typically, fundraising is a more significant revenue stream for private, bachelor's, and master's institutions. In addition, some larger doctoral institutions with a large number of alumni (especially with professional degrees) also have large, sophisticated fundraising operations.

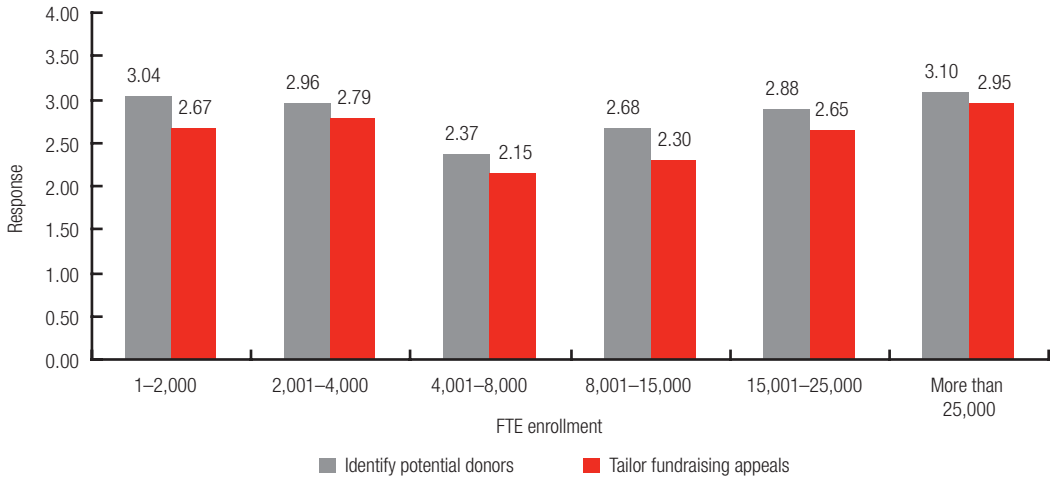
Private institutions use their analytic capacity more frequently than public institutions to identify donors and tailor fundraising strategies. The mean response among private institutions was 3.19 (to identify donors) and 2.94 (to tailor strategies). Comparable responses from public institutions were 2.50 and 2.25, respectively. As Figure 7-2 illustrates, bachelor's institutions on average were the most frequent users among Carnegie classes. They had a mean response of 3.32 (identify donors) and 3.09 (tailor fundraising appeals). The next highest mean responses were from doctoral institutions.

As Figure 7-3 illustrates, there also appears to be a relationship between enrollment size



(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

Figure 7-2. Use of Advanced Analytics in Advancement, by Carnegie Class (N = 379)



(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

Figure 7-3. Use of Advanced Analytics in Advancement, by Enrollment (N = 379)

and use of advanced analytics in fundraising. This relationship follows that of Carnegie class. Smaller and very large institutions are more frequent users than moderate-to-large institutions. It is also possible that both enrollment size and Carnegie class are serving as a proxy for institutional control. Many of the private institutional respondents are smaller bachelor's institutions. Fundraising is generally a more prevalent revenue stream for private institutions than for public institutions.

Finally, we see a relationship between the length of time a respondent has had their analytical capacity and the frequency with which they report advanced fundraising uses. The mean response from institutions that have had analytical capability for more than nine years was 3.11 (identify donors) and 2.96 (tailor fundraising). Conversely, respondents with capability for three to five years had a mean response of 2.65 and 2.55, respectively. As observed previously, many institutions may begin their implementations in central finance or institutional research. Advancement may be among the later recipients of advanced analytical capacity.

Several aspects of management climate also appear to relate to use of advanced analytics in advancement. The two strongest relationships appear to be with the effectiveness of training and the proficiency of staff analytical skills. A stable or dynamic management climate appears also to have a relationship with increased use of analytics in fundraising, although not as strong as for finance or grants management. Unlike the other areas, leadership's commitment to evidence-based decision making does not appear to relate strongly to advanced analytics in advancement. It appears that the advancement area is less sensitive to the overall institution climate and leadership culture. Advancement divisions often function with great independence (in public institutions, they are often organizational, separated from the main institution) and have unique cultures and leadership styles. Table 7-9 summarizes the impact of several factors related to respondents' management climates.

As with other functional areas, we found no significant relationship between technology platform in use and respondents' use of advanced analytics in advancement. Among institutions reporting that they "usually" or "almost always" use their analytical tools to identify potential donors, the largest number (45.8 percent) use their transaction system for reporting. The second largest percentage of respondents (26.7 percent) use multiple data marts.

Student Services

In the student area, we focused on the use of academic analytics in student recruitment and retention. We asked respondents to tell us if they use modeling, what-if analysis, or alerts to improve admissions results, plan interventions if students are at risk of dropping out, and forecast demand for courses. Using a five-point scale, respondents told us how frequently they use their analytical capability to create alerts or perform predictive modeling to improve aspects of enrollment management and retention.

Table 7-10 shows the mean responses to each statement regarding the use of academic analysis in enrollment management and retention. With one exception (identifying students at risk academically), the mean responses are all below 3 ("sometimes"). In the enrollment management area, respondents use their analytical capability more frequently to identify prospective students than to tailor recruiting strategies or to forecast demand. The highest mean frequency of use was to identify prospective students who are strong candidates for admissions (mean of 2.95). The lowest mean frequency was for tailoring recruiting strategies to individuals (2.38). The standard deviations are all greater than one for this series of statements. The highest stan-

Table 7-9. Use of Advanced Analytics in Advancement, by Management Climate

Characteristic	Scale	Identify Potential Donors (N = 361)	Tailor Fundraising Strategies (N = 356)
Effective Training	Almost never	2.19	1.96
	Occasionally	2.63	2.33
	Sometimes	2.81	2.65
	Usually	3.16	2.86
	Almost always	3.10	2.80
Environment	Stable	2.88	2.67
	Dynamic	2.86	2.59
	Volatile	2.25	2.02
	Unstable	2.50	2.15
Management Control	Very decentralized	2.63	2.41
	Somewhat decentralized	2.83	2.60
	Balanced	2.85	2.61
	Centralized	2.76	2.45
	Highly centralized	2.76	2.55
Staff Skilled at Analysis	Strongly disagree	1.76	1.65
	Disagree	2.56	2.27
	Neutral	2.76	2.49
	Agree	3.13	2.90
	Strongly agree	2.67	2.56
Commitment to Evidence-Based Decisions	Strongly disagree	2.00	1.93
	Disagree	2.75	2.27
	Neutral	2.66	2.45
	Agree	2.87	2.66
	Strongly agree	3.02	2.74

Q: *People use my institution's academic analytics to identify potential donors.*

Q: *People use my institution's academic analytics to tailor fundraising appeals for individual donors.*

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always; scale applies to two questions above)

dard deviations are for the two statements pertaining to the use of automated alerts (for an academic intervention or enrollment metrics). This suggests that respondents are not in agreement regarding their use of alerts. We likely have a group of respondents that uses them quite frequently and a group that hardly uses them at all.

In student retention, respondents on average use their academic analytics more

Table 7-10. Use of Academic Analytics in Enrollment Management and Retention

Enrollment Management (N = 356)	Mean	Std. Deviation
Automatically alert appropriate officials when an enrollment metric falls outside a desired range	2.75	1.449
Forecast future demand for courses	2.50	1.176
Identify potential students who are the strongest prospects for admissions	2.95	1.312
Tailor a recruiting strategy for an individual prospective student	2.38	1.283
Retention (N = 362)	**Mean**	**Std. Deviation**
Identify students who may be at risk academically	3.14	1.217
Alert an appropriate official when an academic intervention with a student is warranted	2.56	1.319

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

frequently to create models and analysis to identify students who may be at risk academically. Fewer respondents have integrated this analysis into their business processes to automatically alert appropriate administrators or faculty if a student requires a counseling session or other academic intervention. About 45 percent of respondents (45.4 percent) "usually" or "almost always" use their analytics to identify students who may be at risk, and 28.9 percent generate alerts with similar frequency.

The University of Connecticut is at the forefront of using academic analytics to improve student retention. Registrar Jeff von Munkwitz-Smith explains how. "UConn is extracting student information and putting it into a database of information to study student retention. The goal is to predict which students are most likely to be at risk. Factors under consideration include high school background, where they live on campus, and participation in freshman seminars."

Similarly, the University of Minnesota is a leader in the adoption of academic analytics to predict demand for courses. The university has recently been named a finalist for a ComputerWorld.com business intelligence award for its use of academic analytics to model and monitor demand for courses. According to Sue Grotevant, director of information management systems, the university has developed a set of analytical reports that enable its colleges to model demand for courses and to identify ways to configure more cost-effective course schedules.

Nearly 30 percent of respondents report that they frequently generate automated alerts for academic interventions. This seems quite a large percentage. We did not anticipate that this many institutions would have done the analysis required to target specific events that are early indicators of a student who is at risk and requires counseling. We thought even fewer would have deployed the capacity to generate automated alerts. It is possible that respondents may have widely varied capabilities in this area. For instance, many may have the ability to use the workflow in their ERP systems to alert a counselor if a student drops or fails a class. Alternatively, relatively few may have created automated alert systems that incorporate multiple triggering events tied to data-driven analysis of student outcomes and retention.

Among institutional characteristics, the

strongest relationship is between advanced applications in enrollment management and both Carnegie class and control. These characteristics relate directly to an institution's admissions strategy and selectivity. Private institutions and bachelor's institutions, which tend to be both more selective and more enrollment driven, reported higher mean frequencies for the use of advanced analytics. Table 7-11 contains the mean responses by Carnegie class to the enrollment management-related questions.

The use of advanced analytics for enrollment management is not an exclusive interest of private institutions. Interest among public institutions will grow as competition for students—especially in underrepresented populations—grows. M. Paige Borden, University of Central Florida director of institutional research and university data administrator, describes an initiative under way in enrollment management at that institution. "The implementation of our data warehouse will help our recruiting significantly. We will be able to isolate ideal applicants more easily and tailor our marketing strategy. We will be able to make better determinations as to how to spend our limited resources and be able to better measure our results."

For advanced analytics applications to support retention, the only significant relationship with an institutional characteristic appears to be with Carnegie class. On average, bachelor's institutions have the highest frequency of analytics use to identify students who may be at risk academically (3.40). Associate's and master's institutions have similar mean responses (AA = 3.24, MA = 3.23). Doctoral institutions had the lowest mean frequency (2.76). So it appears that institutions that are more tuition driven use their analytical capacity more frequently to support retention strategies.

Among characteristics of management climate, training efficacy, staff skills, and leadership commitment to evidence-based decision making are the most significant differentiators of institutions that use their analytical capability to support enrollment management. Training, staff skills, and leadership commitment also appear to relate to the frequency with which respondents use advanced analytics to support retention. Table 7-12 illustrates the mean response to statements segmented by characteristics of the respondents' management climate.

Unlike some of the other functional areas, in the student area there appears to be no relationship between advanced analytics application and either the stability of the environment or the degree of centralization

Table 7-11. Advanced Use of Academic Analytics for Enrollment Management, by Carnegie Class (N = 362)

Carnegie Class	Alert appropriate officials when an enrollment metric falls outside a desired range	Forecast future demand for courses	Identify potential students who are the strongest prospects for admissions	Tailor a recruiting strategy for an individual prospective student
DR	2.55	2.36	3.03	2.38
MA	2.81	2.68	3.07	2.63
BA	2.69	2.39	3.33	2.60
AA	3.02	2.55	2.04	1.71
Other	2.82	2.50	2.85	2.17

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

Table 7-12. Use of Advanced Analytics for Retention, by Management Characteristic

	Identify students who may be at risk academically	Alert officials when an academic intervention is warranted
Effective Training	**Mean**	**Mean**
Almost never	2.50	1.93
Occasionally	3.08	2.51
Sometimes	3.18	2.63
Usually	3.38	2.74
Almost always	3.90	3.19
Staff Members Are Skilled at Analysis	**Mean**	**Mean**
Strongly disagree	2.28	1.67
Disagree	2.83	2.11
Neutral	3.15	2.63
Agree	3.47	2.92
Strongly agree	3.89	3.56
Leadership Is Committed to Evidence-Based Decision Making	**Mean**	**Mean**
Strongly disagree	2.50	1.93
Disagree	2.83	1.96
Neutral	3.06	2.46
Agree	3.23	2.71
Strongly agree	3.55	3.06

of management control.

As in the finance, advancement, and grants management areas, there appears to be no relationship between advanced analytics applications and technology platform for enrollment management. Interestingly, there does appear to be a relationship between advanced analytics applications to support retention and technology platform. However, it is not the relationship one would expect. Institutions that primarily report from their transaction system reported a higher frequency of use of advanced analytics for retention. Respondents with more complex technology platforms report less frequent use in support of retention. As Table 7-13 indicates, the second highest frequency of use was among respondents with either an operational data store or multiple data marts.

Summary

An institution's technology platform does not appear to limit its ability to implement advanced applications of academic analytics in targeted functional areas. As we saw in this chapter, respondents with transaction system reporting as well as those with data marts or warehouses appear able to implement advanced uses of their data in individual functional areas. Staff skills, training, and an overall

Table 7-13. Use of Advanced Analytics for Retention by Technology Platform

Primary Technology Platform	Identify students who may be at risk academically	Alert an appropriate official when an academic intervention is warranted
Single data warehouse	2.83	2.10
Multiple data marts	3.05	2.52
Single data mart	2.73	2.48
Reports from operational data store	3.05	2.38
Reports from transaction system	3.39	2.79

(1 = almost never, 2 = occasionally, 3 = sometimes, 4 = usually, 5 = almost always)

commitment from management to use data appear to be more significant predictors of an institution's advanced use of data in its operations. Finally, where an institution makes the most use of its advanced analytics appears in part to be dictated by its mission and strategy. The relative importance of grants management, student retention, and fundraising differ by institution type. The presence of advanced academic analytics applications in these functions follows institutional priorities.

Given the importance respondents placed on outcomes, assessment, and retention, we would expect the student area to see the greatest growth in advanced analytics applications in the future. It stands to reason that institutions will seek greater capability in areas directly tied to student recruitment and retention. The University of Connecticut's Jeff von Munkwitz-Smith summarizes it this way: "We are sitting on a huge amount of data that we do not use, especially [data in] the student information system. Having more tools for predicting their success and advising students beforehand where they need to put in more effort will ultimately help institutions improve retention and graduation rates."

Endnote

1. The survey statement posed to respondents was, "The environment at my institution can best be described as stable, dynamic, volatile, or unstable." This variable has proven significant in several ECAR studies.