Action Learning Seminar on Analytics

Course: Analytics, Machine Learning, and the Digital Economy

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1. What Are Analytics?

Definition: Analytics is the use of data, statistical analysis and explanatory and predictive models to gain insights and act on complex issues.

ANALYTICS


STRATEGIC QUESTION
DATA ANALYSIS AND PREDICTION
INSIGHT AND ACTION

Additional Definitions

- ***Leveraging Analytics*** is the purposeful building of analytics organizational capacity and using of analytics to gain insights, take actions and accelerate the addressing of key strategic problems/goals for institutions.

- ***Action Plans for Analytics*** frame and address strategic problems that can be solved through analytics.

- ***Institutional Strategy for Analytics*** expresses the leveraging of analytics as a major change initiative that can be aligned with and embedded in other institutional strategies.

Steps in the Analytics Process

- Start with a strategic question.
- Finding or collecting the appropriate data to answer that question.
- Analyzing the data with an eye toward prediction and insight.
- Representing or presenting findings in ways that are both understandable and actionable.
- Feeding back into the process of addressing strategic questions and creating new.

Purposefully Build Analytics Capacity

- Understand the analytics elements that add value.
- Focus on key strategic goals – such as optimizing student success.
- Use understandable frameworks (Davenport and Harris) to communicate current and desired future states.
- Purposefully develop organizational capacity for analytics toward strategic ends.
- Use accelerants to advance development.

Useful Templates and Typologies

- Davenport/Harris typology
  8 levels - reporting, query, analysis, optimization
- Davenport – DELTA typology (Data, enterprise, leadership, targets, analysis) - 5 elements
- Norris/Baer typology - Student Success
  7 levels
- Organization Capacity/Maturity Index
  5 elements

Analytics and Optimizing Student Success

	Type of Reporting, Query & Analytics	Focus	Decision Making & Action Perspective
Analytics	Optimization	What's the best that can happen?	Overall management and orchestration of analysis/query/reporting
	Predictive Modeling	What will happen next?	Embed predictive analytics in processes
	Forecasting/ Extrapolation	What if these trends continue?	Create "what if" capacity
	Statistical Analysis	Why is this happening?	Understand "why"
Query and Reporting	Alerts (Real Time)	What actions/ interventions are needed?	Intervene
	Query/Drill Down (Real Time)	Where exactly is the problem?	Target problem groups, individuals or processes
	Ad Hoc Reports (Real Time)	How many, how often, where?	Conduct special analyses to gain fresh perspectives
	Standard Reports (Real Time)	What happened?	Continuous review, standard metrics

Data Governance and Stewardship Perspective: Improve quality and availability of data for optimizing student success.

Source: Adapted from Davenport and Harris 2007

2. Where are Analytics Most Useful?

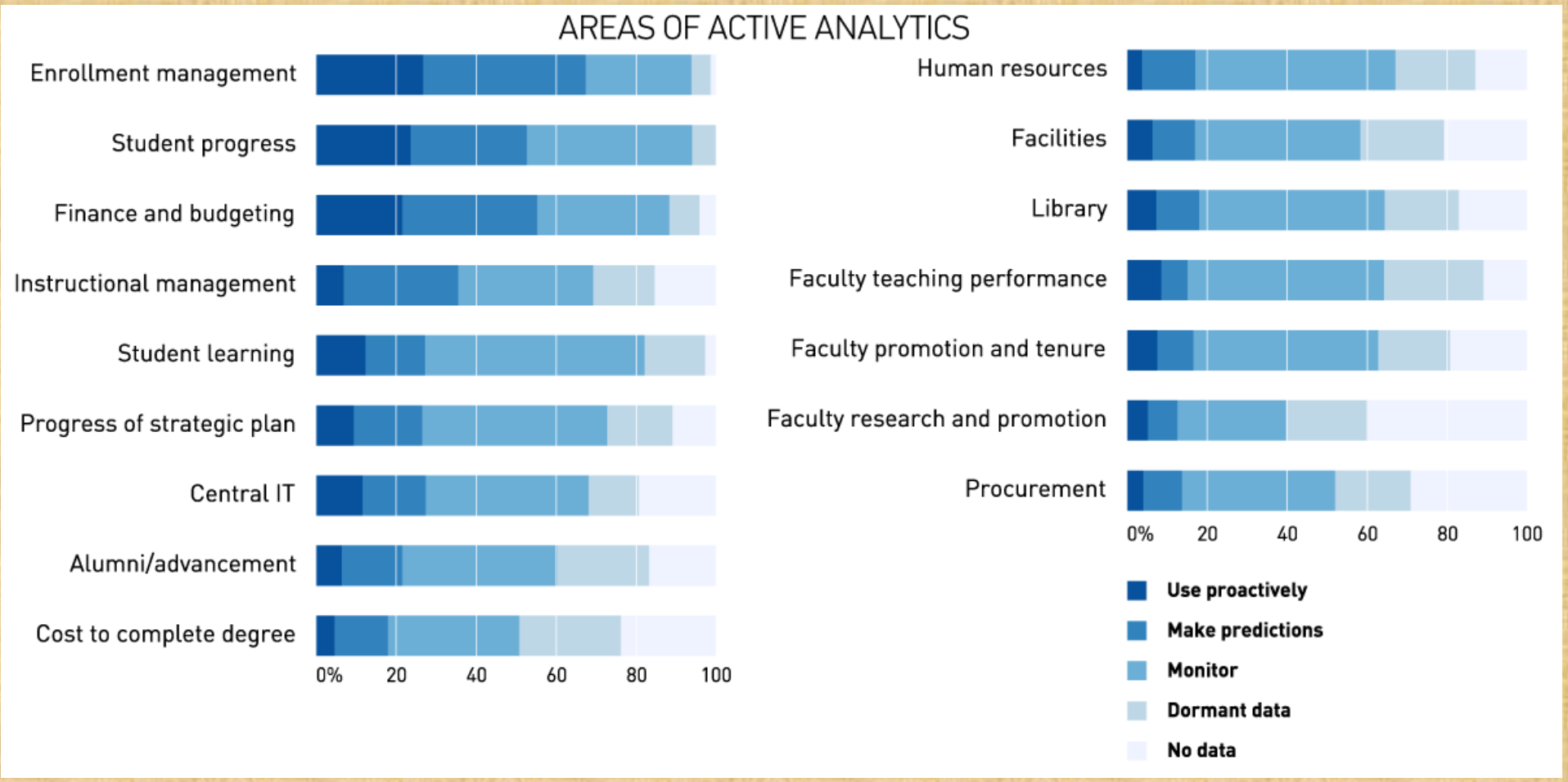
Primary Sources of Information

- **ECAR Survey –** representative study of use of analytics in all applications, survey of IT and IR professionals at several hundred institutions

Primary Sources of Information

- **Optimizing Student Success –** Selective study of use of analytics to optimize student success at 40 leading institutions (all types) and 20 solution providers

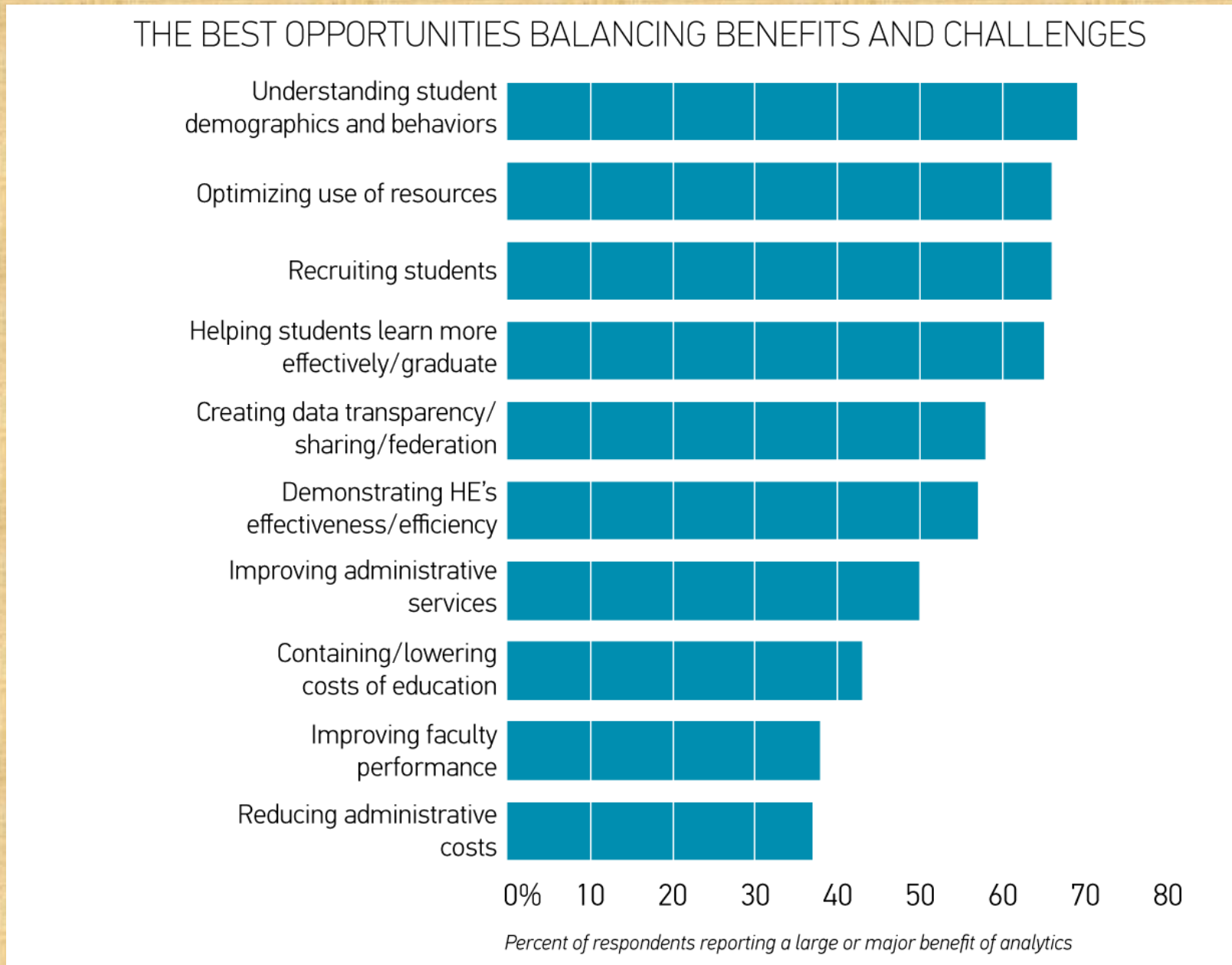
Most Activity in Student and Finance Areas, Least in Faculty



Targets and Benefits of Analytics (From Previous Slide)

- Enrollment management
- Finance and budgeting
- Student progress
- Instructional management
- Central IT
- Student learning
- Progress of strategic plan
- Alumni advancement
- Research administration

More Optimism around Student Areas than Cost or Faculty



Proven Means for Optimizing Student Success

- Managing the student pipeline, at risk students
- Eliminating impediments to success
- Dynamic query, alert and intervention, at-risk behavior
- Learner relationship management systems and processes
- Personalized learning system environments and learning analytics (Next Gen Learning)
- Data mining/Big Data
- Extend success to include employability/work

3. What Are Some of the Best Practices in Leading Institutions and Solution Providers?

Selecting Institutions and Solution Providers

- **40+ leading institutions** – primarily online, research universities, comprehensive universities, community colleges, private institutions, systems of institutions

- **20 solution providers** in a range of areas – ERP, LMS, retention, analytics, personalized learning

Summary of Findings, Institutional Type

Category	Summary Description
Primarily Online Universities	***For-profit universities*** *have been the earliest and most advanced in having developed:* *1) a strong, top leadership commitment to performance analytics,* *2) pervasive cultures and behaviors of performance measurement and improvement, and* *3) embedding predictive analytics in academic and academic support/administrative processes. They rely on analytics-supported service as a source of competitive advantage. While the for-profits were first to market with advanced analytics, not-for-profit, primarily online institutions, such as the UMUC have also deployed such tools.*
Research Universities	***Research Universities*** *are perhaps the most sophisticated ICT enterprises in higher education.* *They provide world-class ICT capabilities/services (including analytics) to highly diverse, complex and sophisticated communities of users. They are complex, decentralized, and have a prevailing culture of faculty autonomy. This complicates changing organizational culture and achieving consistent, pervasive behaviors relating to performance measurement and improvement.* *Some of these universities use highly sophisticated student success analytics at the department/school level. Others like Purdue, UMBC, and Arizona State have made significant investments in student success analytics for some time, realizing significant results, and are recognized as exemplary practice leaders.*
Comprehensive Universities	***Comprehensive Universities*** *are among the strongest candidates for high return-on-investment from student success analytics and interventions. Among our case studies, many of these institutions are achieving impressive, demonstrable improvements in student success.* *The American Association of State Colleges and Universities (AASCU), which represents many of these institutions as a professional association has been a major supporter of analytics in higher education.*

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Summary of Findings, Institutional Type

Category	Summary Description
Private Colleges and Universities	***Private Colleges and Universities*** *were among the early adopters of Strategic Enrollment Management as applied to the student pipeline and freshmen experience/gateway courses.* *While our selection of private institutions varies dramatically in size and mission, they provide some interesting strategies and approaches to analytics. Some can point to demonstrable improvements in student success from their analytics applications.*
Community and Technical Colleges	***Community Colleges*** *are a rapidly growing sector. They are actively engaged in analytics focused on student success.Community Colleges like Rio Salado, Cuyahog Community College, and Sinclair Community College are highly sophisticated, with demonstrable results from their analytics-supported, interventions.* *The American Association of Community Colleges (AACC), which represents community, junior and technical colleges, is very active in promoting student success analytics.*
Systems of Institutions	***Systems of Institutions*** *present opportunities for analytics that can manage and improve student success across the different campuses in the system and down into individual institutions. These institutions also illustrate the technical, organization, and political challenges of attempting to enhance analytics capabilities in multi-institution settings.*

Leading Solution Providers in Survey

Categories	First Round – 20 initial Solution Providers		Second Round – 20 more Solution Providers	
ERP/BI	• Oracle/PeopleSoft/ Hyperion • SunGard/Datatel • Campus Management	• Jenzabar • SAP/Business Objects • Top School	• Destiny Solutions • Adobe	
LMS	• Blackboard/ iStrategy • Moodlerooms • Desire2Learn	• Pearson/eCollege • LoudCloud • Sakai/Kuai	• Instructure/Canvas • Campus Cruiser	
Customer/ Constituent Management			• Salesforce.com • Talisma	
Advising/ Retention	• Starfish Retention Solutions	• EBI/MAPWorks • RapidInsight	• Hobsons • Respondus	
Visualization/ Dashboard/ Analytics Consulting/ Generalized Advising	• IBM (SPSS/Cognos) • Microsoft • eThority	• Nuventive • eVisions	• iDashboard • Tableau	• Qlik Tech • Civitas
Personalized Learning Environments			• WebStudy • Knewton • Cengage • Turning Technologies • Epsilen • SoftChalk	• Ucompas • eXact Learning Solutions • GoingOn • SMART Technologies

Many Types of Student Success Analytics

- These institutions are all engaging in student success analytics of seven types

Many Types of Student Success Analytics

- Most institutions were engaged in 3-5 of these activities

Many Types of Student Success Analytics

- Even among these leaders, there was great variation in levels of accomplishment and sophistication
- The solution vendors believe the industry has a long way to go

Many Types of Student Success Analytics

- The solution vendors believe the industry has a long way to go

Norris/Baer Framework: Optimizing Student Success through Analytics

Elements	Description	Examples
1. Manage the student pipeline	*Scientifically refine strategic enrolment management of the student pipeline.*	• *Use data mining and predictive analytics to improve the recruitment, admission, and enrolment of entering students (raise numbers and improve chances of student success; and* • *Use longitudinal and predictive analytics to craft policies for improving success of **at-risk students**.*
2. Eliminate impediments to retention and student success	*Eliminate structural, policy, and programmatic impediments to retention and success.*	• *Use analytics to support **comprehensive** first-year programs;* • *Eliminate bottlenecks in courses and program progressions; unreasonable pre-requisites and other requirements; and* • *Use predictive analytics to shape policies and practices to enhance retention in sophomore-senior years.*
3. Utilize dynamic, predictive analytics to respond to at-risk behavior	*Embed analytics in academic and administrative support processes to enable real-time interventions dealing with at-risk behaviors, both academic and co-curricular.*	• *Use dynamic, predictive analytics to determine at-risk behavior in courses early in the semester; Embed predictive analytics in processes; and* • *Monitor levels of student engagement in academic and co-curricular activies and intervene with students who can be saved.*
4. Evolve learner relationship management systems	*Build tracking systems that can track and manage the many facets of learner progress and identify and respond to at-risk behavior.*	• *Create the learner equivalents of customer relationship management functionality, supported by predictive analytics; and* • *Extend dynamic, predictive analytics to learner relationship management.*

Continues…

Norris/Baer Framework: Optimizing Student Success through Analytics

Elements	Description	Examples
5. Create personalized learning environments/ learning analytics	Embed personalized learning analytics into learning management systems and learner relationship management systems	• Create personalized learning modes with embedded predictive performance analytics; • Use these analytics-rich systems to personalize learning outcomes; and • Create learning experiences reaching beyond formal curricula.
6. Engage in large-scale data mining	Use data mining to illuminate pathways to student success and discover unforeseen insights.	• Leverage data mining to drive predictive modelling in processes; • Use forensic data mining to explore unthought-of correlates of success; and • Engage in cross-institutional comparisons and cross-sectoral comparisons.
7. Extend student success to include learning, workforce, and life success	Expand the definition of student success to include the entire student lifecycle – cradle to career, including learning, work, learning-to-work transitions, and workforce success.	• Extend into Alumni analytics; • Undertake data mining spanning institutions, industries, and sectors; and • Pioneer pathway-to-success analysis.

Organizational Capacity for Analytics

Preliminary Insights – Leading Institutions (1)

- Some leading-edge institutions are achieving strong ROI on student success analytics, the killer app for analytics
- Good case studies on successful execution and capacity building, with different patterns for different types of institutions
- Leadership commitment is critical to move beyond departmental solutions and to changing behaviors
- Examples of all levels of optimizing student success techniques being demonstrated by some leading institutions
- Wide variety of build/buy/mash-up strategies being used

Preliminary Insights – Solution Provider Capacity (2)

- Expanded emphasis on analytics – new functionalities, applications, solutions, consulting services
- Expanded student success solutions from BI/ERP and LMS providers
- New vendors in many categories – retention and student success, personalized learning, K-12, workforce
- Cloud-based applications demonstrate the cloud's potential to leverage vendor infrastructure, solutions, processes, cross-sector linkages, know-how
- Strong marketplace incentives for continuing vendor innovations, expansion to Next Gen learning

Preliminary Insights – Capacity of Typical Institutions(3)

- Many institutional leaders overestimate their data, information and analytics capacity. Substantial need for professional development, capacity building, and raising “analytics IQ”
- Need for affordable analytics solution that deliver student success-based ROI. The bar keeps being raised for analytics possibilities
- Strong accountability demands for analytics for student success and productivity
- Learning analytics combines enterprise-based and free-range learning.

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