Learning Analytics

**Goal:** Scale the real-time use of learning analytics by students, instructors, and academic advisors to improve student success.

**Premises**

1. **Analytics is a proven approach to predicting student learning performance that has been successfully applied to a variety of courses and programs.**


   The Signals project at Purdue University mines institutional data from IT systems to track students’ efforts in their courses. Signals processes the data and indicates individual students’ current risk level in real time, denoted by a green, yellow, or red indicator. The “actionable intelligence” that the system generates is used to prompt interventions such as steering at-risk students to guidance about steps they can take to increase their likelihood of success. Additionally, students have access to their own profiles so that they can monitor their progress. Between fall 2007 and fall 2009, results from the Signals program showed 12 percent gains in the attainment of B and C grades in course sections that used the tool, as well as a 14 percent reduction in the level of D and F grades. Students commented that the tool made them aware of weaknesses in their academic effort, providing the information and motivation they needed to achieve a better grade.


   The practice of academic analytics can create actionable intelligence for higher education institutions, providing a new means for colleges and universities to document learning outcomes and meet expectations for accountability. For example, the University of Alabama used data files from enrolled freshmen from the years 1999–2001 to develop predictive models of at-risk students. With this application, the university can identify 150–200 freshmen each year who are unlikely to return for their sophomore year, and active interventions for these students start early.


   Analytics tools provide statistical evaluation of rich data sources to discern patterns that can help individuals make more informed decisions. Colleges and universities can evaluate data from learning management systems, college application forms, and library records to construct predictive models for student success. In this way, institutions can use data they likely already collect to increase student achievement and retention.

2. **Monitoring and/or predicting student performance enables targeted interventions that are more efficient and effective for students and the institution than just-in-case, across-the-board student support programs.**

Researchers studied eight student-behavior variables in nearly two dozen courses, spanning humanities, social sciences, and hard sciences, and correlated this data with student success. They noted that today's IT tools, including learning management systems, can collect data not only on what activities students engage in but also how much time they spend doing them, how often they return, and other data points. Five of the variables (number of discussion posts read, number of original posts, number of follow-up posts, seconds reading discussions, and seconds on content pages) were statistically significant and were valid predictors of final grades. The researchers found that successful students are between two and three times more active than unsuccessful students, spending an average of nearly 16 hours engaged in online coursework, compared to less than 6 hours for students who did not succeed. They conclude that analysis of the data that IT systems collect can be used to create “early warning systems” to identify at-risk students and guide interventions.


Researchers studied the effectiveness of programs at higher education institutions that analyze data from student information systems, learning management systems, and communication tools to improve student performance. These institutions take advantage of the data-capture mechanisms in IT systems to correlate quantifiable data with learning outcomes. Broad sources of data allow an institution to track student effort beginning with admissions all the way through their academic careers and employment transitions. According to the researchers, such an approach builds a detailed picture of the activities that students, instructors, and the institution can use “to improve relevance, efficiency, and effectiveness in a higher education institution.” They also contend that greater integration of institutional systems can more fully inform efforts to improve teaching and enhance student learning.

3. **Performance information and predictions enable students, faculty, and advisors to improve student success.**


Researchers at the University of California, Santa Barbara, developed a tool called Moodog that analyzed log data from the institution’s course management system in order to show instructors how students interact with online course materials and to allow students to see how their efforts compare to those of other students in the class. The tool tracked total number of views, total number of sessions, total online time, number of viewed resources, number of initial threads posted by the user, and the number of follow-up messages posted, and this data was rendered in a graphical interface. Moodog also reminded students by e-mail of resources they hadn’t yet accessed. The research showed a positive correlation between forum activity and a student’s overall course grade in the course. The tool also allows faculty to evaluate the effectiveness of specific learning resources and how they correlate with student success.

As graduation rates at U.S. colleges and universities continue to trail those of other nations, institutions are being held increasingly accountable for the performance of their students. Analytics programs have the potential to be an important tool in efforts to increase student success, not only in individual courses but in programs of study and in transitioning into the workforce. Such programs can integrate larger and more complex sets of data to provide more effective interventions that increase retention and success rates.


This presentation focuses on integrating college processes with a “Pathways Approach” at Tallahassee Community College to support a teacher/learner continuum and measure key performance indicators, with early alerts and quality enhancement benchmarks to impact student learning outcomes. Through this process, the Student Learning Plan includes an e-portfolio of continuously updated data sources: transcripts, schedules, financial aid information, orientation plans, student diagnostics, planned interventions, communication schedules, and processes for interaction and engagement.


Broward Community College and Valencia Community College offer a variety of degree, continuing education, and certificate programs that attract a great diversity of students. These students span the learning spectrum from developmental education to gifted. Both colleges have created a series of programs that use analytics to identify and implement programs designed to meet the higher education needs of all individuals.


This video session features an award-winning Tennessee Board of Regents computer-based, instructional program that benefits students requiring flexible course schedules or individualized instruction in developmental reading, writing, math, and college algebra courses with learner analytics and new diagnostic processes. Examine how NewSkills promotes student learning with diagnostic assessments, targeted remediation, post-tests, one-on-one tutoring, and academic counseling and advising.

Examples of Learning Analytics Programs

- **Purdue University**: Signals—Stoplights for Student Success ([http://www.itap.purdue.edu/tlt/signals/](http://www.itap.purdue.edu/tlt/signals/)) is a system developed to detect early warning signs of academic difficulty and provide intervention to students who are not performing well. The system combines predictive modeling with data-mining from Purdue’s course management system and assigns each student a risk level—green, yellow, or red. As of January 2010, more than 11,000 students have been impacted by the Signals project, and more than 50 instructors have used Signals in at least one of their courses.

- **The University of Maryland, Baltimore County**: Officials at UMBC have implemented analytics tools that show, for example, that in certain courses between fall 2007 and spring 2009, students who earned a D or below used the institution’s CMS 39% less than students who earned a C or better. (See [http://www.educause.edu/Resources/UsingAnalyticstoInterveneWithU/196159](http://www.educause.edu/Resources/UsingAnalyticstoInterveneWithU/196159).)

- **Grand Rapids Community College** has launched an effort called Project Astro, intended to uncover the elements of the college’s learning systems that student use most often and are most closely correlated
with student retention and success. The college plans to use the system for interventions with at-risk students. (See http://www.educause.edu/Resources/UsingAnalyticstoIntervenewithU/196159.)

- **University of Wollongong:** The Social Networks Adapting Pedagogical Practice (SNAPP) tool (http://research.uow.edu.au/learningnetworks/seeing/snapp/index.html) creates visual representations that map user interactions on social networks, illustrating patterns of behavior. These visualizations illustrate levels of engagement and activity among groups of users, and this can reveal students at risk of underperformance from lack of interaction. The visualizations can also show students how their level of activity compares to that of other students. Faculty can use such information to guide interventions and also to direct learning activities to be most effective.

- **Northern Arizona University:** The Grade Performance Status (GPS) Academic Early Alert and Retention System (http://www4.nau.edu/gateway/Faculty/GPS/index.htm) is a multi-tiered guidance system for student academic success and retention. The system provides updates in four areas: attendance, grade, academics, and positive feedback. Depending upon the update a student receives, the student is provided with suggested options and resources to improve performance.

- **Sinclair Community College:** The Research, Analytics, and Reporting office at SCC tracks institutional data and uses analytics to identify certain students as “at-risk” and initiate the Individual Learning Plan (ILP) program. Students who complete an entire ILP show considerable increases in retention and GPA compared to at-risk students who students who do not participate in the ILP program. Data from SCC indicate that providing extra resources to students who are at risk has a positive impact on student success. (See http://www.sinclair.edu/stservices/edu/pub/FA06%20ILP%20Results.pdf.)

- **Albany Technical College:** The Student Tracking and Retention Services (STARS) Program is designed to serve high-risk students by personally connecting them with counselors who serve as mentors and advisors through Web 2.0 and low-cost PDA support systems. STARS counselors are responsible for making a personal connection with all new students within the first two weeks of enrollment. Counselors maintain contact with new students through their first term by providing support and assistance before students are overwhelmed or face insurmountable academic or personal difficulties. The STARS program has increased the retention rate to 87% compared with rates prior to this intervention (68.3%), and STARS has also increased Academic Affairs and Student Affairs collaboration while generating new ideas and ways of helping students. (See http://www.league.org/league/competitions/innovations/display2010.cfm.)