**Time-to-Adoption Horizon: Four to Five Years**

Learning analytics promises to harness the power of advances in data mining, interpretation, and modeling to improve understandings of teaching and learning, and to tailor education to individual students more effectively. Still in its early stages, learning analytics responds to calls for accountability on campuses across the country, and leverages the vast amount of data produced by students in day-to-day academic activities. While learning analytics has already been used in admissions and fund-raising efforts on several campuses, “academic analytics” is just beginning to take shape.

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**Overview**

Learning analytics refers to the interpretation of a wide range of data produced by and gathered on behalf of students in order to assess academic progress, predict future performance, and spot potential issues. Data are collected from explicit student actions, such as completing assignments and taking exams, and from tacit actions, including online social interactions, extracurricular activities, posts on discussion forums, and other activities that are not directly assessed as part of the student’s educational progress. Analysis models that process and display the data assist faculty members and school personnel in interpretation. The goal of learning analytics is to enable teachers and schools to tailor educational opportunities to each student’s level of need and ability.

At its heart, learning analytics is about analyzing a wealth of information about students in a way that would allow schools to take action. This information can include student profiles within an institution’s database, as well as the interactions of students within course management systems. A long absence from a course’s online activities, for example, can trigger faculty intervention. At its best, however, learning analytics goes much further than this, marrying information from disparate sources to create a far more robust and nuanced profile of students, in turn offering faculty members more insight.

Learning analytics need not simply focus on student performance. It might be used as well to assess curricula, programs, and institutions. It could contribute to existing assessment efforts on a campus, helping provide a deeper analysis, or it might be used to transform pedagogy in a more radical manner. It might also be used by students themselves, creating opportunities for holistic synthesis across both formal and informal learning activities.

While EDUCAUSE has announced a major program in partnership with the Gates Foundation, the Hewlett Foundation, and others that identifies learning analytics as one of five key areas for development, it is still very early and most of the work in this area is conceptual. Learning analytics also faces some challenges. It requires combining data from disparate sources, often in different formats. It also carries with it concerns about student privacy and profiling, as well as the sense that students are being reduced to information and numbers. Indeed, learning analytics to date generally falls within the purview of IT departments. For the information and its use to be more productive within curricula and pedagogy, faculty will need both to understand its technical potential, as well its pedagogical usefulness. These challenges will need to be addressed as the work moves forward. The potential for learning is clear, but the technology to deliver that potential is still very young.

**Relevance for Teaching, Learning, Research, or Creative Inquiry**

Learning analytics in higher education has centered primarily on identifying at-risk students who can then receive attention to avoid failure in a particular course. The Signals project at Purdue University is an exemplary instance of this use. Initiated in 2007, Signals gathers information from SIS, course management systems, and course gradebooks to generate a risk level for students, and those designated as at-risk are targeted for outreach.
The larger promise of learning analytics, however, is that when correctly applied and interpreted, it will enable faculty to more precisely identify student learning needs and tailor instruction appropriately. This has implications not simply for individual student performance, but in how educators perceive teaching, learning, and assessment. By offering information in real time, learning analytics can support immediate alterations, suggesting a model of curriculum that is more fluid and open to change.

There are currently several kinds of tools for learning analytics including those that might be adapted for educational purposes, and those developed specifically to connect with existing educational tools. Commercial applications include Mixpanel analytics, which offers real-time data visualization documenting how users are engaging with material on a website. Similarly, Userfly, designed for usability testing, provides the ability to record the behavior of visitors to websites, and then play it back for analysis. Moving in a different direction, Gephi is a free, open source interactive visualization and exploration platform described as “Photoshop but for data.” It is connected to exploratory data analysis.

Among the tools developed specifically for learning analytics is Socrato, an online learning analytics service that generates diagnostic and performance reports. SNAPP (Social Networks Adapting Pedagogical Practice), developed by the University of Wollongong in Australia, is a tool designed to expand on the basic information gathered within learning management systems; this information tends to center on how often and for how long students interact with posted material. SNAPP instead visualizes how students interact with discussion forum posts, giving significance to the socio-constructivist activities of students.

Perhaps one of most compelling aspects of learning analytics centers on collaborations between IT staff and faculty, or those working in computer science and HCI, and those working in non-computational disciplines. At Ball State University, for example, computer science professor Paul Gestwicki and English professor Brian McNely are co-developing software for enhancing collaborative knowledge work. Using current theories of learning, rhetoric, writing, and human-computer interaction, the pair is designing an interactive visualization system with the goal of providing a richer understanding of collaboration and a framework for more effective evaluation of the collaborative process within writing.

The explosion of data has offered access to tremendous amounts of information, and one of the challenges for educational institutions centers on how best to keep pace with the tools used for processing and interpreting this data in the fields of business, marketing, and entertainment. Learning analytics offers one direction, with considerable potential to enhance teaching, learning, and assessment if used with sophistication and in tandem with productive theories of contemporary learning practices.

A sampling of applications of learning analytics across disciplines includes the following:

• **Education.** Students in education programs can utilize learning analytics to incorporate into their pedagogy when they leave the academy. The use and study of analytics in their coursework can better prepare them to be leaders in this emerging area of education.

• **Instructional Technology.** Instructional technologists can use learning analytics to help educators design systems and approaches to better measure student outcomes and faculty development. These approaches can help lead the way to new ways of thinking and new technologies to better track, visualize, and mine data for application in learning analytics.

• **Nursing.** By analyzing the access patterns of students watching online videos captured from class lectures, the College of Nursing at The Ohio State University is able to track who is watching videos, how much they are viewing, and how they are viewing the content.

**Learning Analytics in Practice**
The following links provide examples of how learning analytics are being used in higher education settings.

18 **Academic Early Alert and Retention System**  
[http://www4.nau.edu/ua/GPS/student/](http://www4.nau.edu/ua/GPS/student/)  
Northern Arizona University uses a guidance system for students aimed at improving student academic success and retention. The system provides feedback to students in four areas (attendance, grade, academics, and positive feedback). Depending on the feedback given, students are given options and pointed to resources to help them improve.

19 **Learning Analytics — Visualizing Collaborative Knowledge Work**  
The Visualizing Collaboration Knowledge Work project at Ball State University is designed to visualize collaborative writing processes in order to support stronger formative evaluation.

20 **Scribd Stats**  
Scribd, a document sharing hub, has created a feature that it describes as “Google Analytics for documents” due to its ability to measure in greater detail how differing documents, presentations, and files are being used.

21 **Signals — Stoplights to Student Success**  
[http://www.itap.purdue.edu/tlt/signals/](http://www.itap.purdue.edu/tlt/signals/)  
The Signals system at Purdue University provides tools for faculty to identify and help students through analytical data mining.

22 **SNAPP—Social Networks Adapting Pedagogical Practice**  
The University of Wollongong in Australia uses SNAPP, a software application that visualizes data from discussion forum posts to allow faculty to perceive behavioral patterns.