

# Developments in Learning Analytics

## Scenario

As a single mom with a part-time job who had started a nursing program at Marston State University, Mary Jenkins didn't have much time for studying. So she wasn't entirely surprised when she got an e-mail asking her to see an advisor about her poor performance in Biology 101.

Mary's stumble was part of a larger problem. Administrators at Marston State were frustrated by the institution's poor showing overall in key metrics for student outcomes. Graduation and retention rates were low, and there were big achievement gaps between white students and students of color, and between wealthier students and those from low-income households.

Collecting data had helped the university clarify how students were falling short. Building on that, the president empowered a task force to develop ways to use data analytics to find solutions. The task force migrated student data to a learning record store, with a particular focus on making data interoperable. The university also adopted several tools—some homegrown, some purchased from vendors—to collate and analyze key data. The new tools help the university synthesize and analyze a wide variety of data points, including student grades, class attendance and participation, and use of institutional resources like online tutoring, the library, and the career center.

Sophisticated algorithms produce rich insights at a granular level. As it did with Mary, the system flags students who are at risk of not completing a course and asks them to see an advisor immediately. Advisors can provide students with strategies to help them get back on track academically or, if necessary, make hard choices about whether a student's choice of major fits his or her academic inclinations. Faculty—who along with administrators and staff can access key data in dashboard formats—are beginning to see how learning analytics can help them improve curriculum, pedagogy, and assessments. More broadly, Marston State can analyze patterns in student performance that helps inform evidence-based administrative decisions.

Mary's visit with her advisor proved momentous. The advisor showed Mary data about how achievement in Biology 101 was a pivotal prerequisite for ultimate success in the nursing program. Seeing that course as a stepping stone helped Mary recognize that she needed to do better. The advisor helped her arrange tutoring with a graduate student and showed her online guides for better study habits. With that help, Mary got back on track and completed the course with a "B."

## 1 What is it?

Learning analytics is **the use of data, analysis, and predictive modeling to improve teaching and learning**. Educational applications and services generate growing amounts of data about students and their behaviors. Learning analytics examines the data, looking for patterns and correlations that can provide insight to learners, instructors, and those who support them about how to improve learning. Analytics models use data from various sources—often aggregating data in new ways—to help students and institutions understand past and present academic performance and predict future performance. These insights form the basis of feedback, recommendations, and interventions to improve student outcomes. Learning analytics can also drive discovery in other avenues, including personalized learning, pedagogical practices, curriculum development, institutional planning, and research.

## 2 How does it work?

Institutions decide what data to use, which could include data already being collected as well as new kinds and sources of data. Data can be based on multiple dimensions of a learner's activities, including attendance and participation in class, in co-curricular activities, and in educational activities online, such as course discussion boards and the use of library resources. These data might reside in any number of repositories, such as LMSs, learning tools, and the institution's student information system. Increasingly, institutions collate such data in aggregated data repositories, such as a central data warehouse or learning record store. Analytical tools process the data, **applying models and algorithms designed to produce actionable findings**, which might include triggers to help at-risk students or suggestions of programs of study better matched to a student's aptitudes.

## 3 Who's doing it?

Although most colleges and universities have shown interest in learning analytics, **much of the work remains at an early stage**. Still, several universities have developed practices that are showing promising results. As part of a broad student-success initiative, [Georgia State University](#) identified key indicators and tailored individual interventions, improving graduation rates significantly and narrowing the graduation gap for low-income, first-generation, and minority students. The [University of Maryland Baltimore County](#) developed a tool that enables learners to

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benchmark their academic performance against that of peers and prods underperforming students with suggestions about how to improve academic performance. At the [University of Central Florida](#), an Analytics Insights and Action Team helps increase undergraduate persistence by synthesizing insights from various analytics tools and developing processes that identify at-risk students. The [Digital Innovation Greenhouse at the University of Michigan](#) works with user communities to adopt wider use of digital engagement tools like E-Coach, a tool that personalizes learning for students in large classes.

## 4 Why is it significant?

Learning analytics can help students be better learners, help faculty be better instructors, and help the institution meet its goals. At some institutions, learning analytics has improved the outcomes of individual learners, sometimes dramatically, by **helping students understand which habits and behaviors tend to contribute to academic success**. Learning analytics helps faculty by showing which learning activities are most effective for which students. At the institutional level, learning analytics can help students stay in college by speeding progress to graduation, potentially realizing cost savings for both the student and the institution. For higher education as a whole, learning analytics can help institutions contribute to national goals for helping more students succeed in college.

## 5 What are the downsides?

Learning analytics looks at proxies for learning, and it can be tempting to mistake correlations for causation. Learning analytics requires close cooperation between campus departments that traditionally have worked independently (e.g., IT, academic affairs, student affairs, and faculty). Data required for learning analytics can be distributed across campus and difficult to integrate, particularly if technology vendors format data in proprietary ways. Available data may not be suitable for analytics models. **Using student data for analytics raises ethical issues** surrounding data privacy and institutional obligations to act on analytics findings, including by providing resources to assist those learners. Analytics algorithms may include biases and may mislead the very students they are intended to help, perhaps prioritizing efficiency toward a credential

over a learner's passions. Misapprehensions about analytics among university administrators can result in unrealistic expectations for results, and some faculty resist analytics, arguing that it focuses on behavior rather than on learning.

## 6 Where is it going?

Learning analytics is **gradually becoming more sophisticated**, with the development of more advanced techniques and improved integration of disparate data sets from a broader range of sources, including the Internet of Things. The data sets themselves are becoming more accurate indicators of learning behavior. Evolving learning data standards (e.g., xAPI and Caliper) may make it possible to aggregate much more learning data than do applications that have their own language for learning data. A growing range of institutional and vendor tools for learning analytics will be developed and refined, and applications such as the LMS will increasingly be judged on how well they integrate with or provide learning analytics. As understanding grows across the academy about the power of learning analytics, it will be seen as strategic. Learning analytics will move from being an IT tool to being a learning tool and from an optional feature to a required component of academic technologies.

## 7 What are the implications for teaching and learning?

Learning analytics can help colleges and universities prove and improve their efficacy as learning institutions. This kind of analytics can help an institution **identify which students are not learning effectively and intervene to improve their educational trajectory**. It can also help students find which academic paths are best suited to their interests and capitalize on their individual strengths. Learning analytics can help students map their academic progress in near-real time, without waiting for midterms or final exams, and can inspire them to take a more active role in their learning. Insights gained can spark ideas for ways that faculty members can improve instruction. Data gleaned from analytics might help institutions design better courses and make better use of learning resources such as faculty talent. Eventually, learning analytics may lead educators to have a deeper understanding of customized learning paths.