Making Sense Of and Leveraging Learning Analytics — Higher Education’s Emerging Institutional Asset

By Corrie Pelc

Idea in brief
While online learning is used in a larger number of courses, educators may be underutilizing the data that is generated through their learning technology tools. In order to benefit from data in the most powerful way possible, it’s important for educators to have a better understanding of what this data is and what it is not.

According to the “2015 Online Report Card — Tracking Online Education in the United States” by the Online Learning Consortium, more than one in four university students — or 28 percent — are taking at least one distance education course. Among academic leaders, 71.4 percent believe learning outcomes in online education are the same or superior to those in face-to-face instruction. Much of this growth is driven by the benefits an online curriculum can offer. Done well, online learning:
• can scale up or down to suit specific learning goals;
• can be easily and more quickly updated;
• is often more current than printed material; and
• is easier to access, search, and store.

But online learning has another under-recognized benefit — how the data it generates can become a valuable institutional asset in improving learning outcomes. Online learning environments usually have the ability to collect two main kinds of data. First is student participation data such as logins, time on page, or number of page views. Second is learning data that specifically reveals patterns in student learning based on real time analysis of their progress through activities.

Systems that combine participation and learning data give a much more nuanced view of student learning than what might otherwise be possible by just looking at participation data alone. Adaptive platforms like Acrobatiq, for example, combine student activity data with a proprietary statistical model that generates a learning estimate for each student and for every learner outcome. As the learner is learning, the system is also learning about the learner and recalibrating the online learning experience based on how well the student is progressing against the outcomes.

Combining this type of nuanced learning measurement allows educators to:
• reveal what students did or did not learn;
• quantify how well students have learned each skill;
• identify consequential patterns in student learning behaviors; and
• measure the effectiveness of instructional and design choices.

With both engagement and learning data, educators can quickly see who’s learning, who’s not, and where help is needed most. However, in order to see this type of learning data, the course content has to be structured, and a learning analytics model is required to collect, analyze, and make sense of the data to produce meaningful and actionable insights. It also helps if educators have a better understanding of how the data is being generated and visualized so they can use it effectively to help students who may be at risk and to identify areas in their course proving challenging to students.

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— Benny Johnson

Analytics vs. reporting
To use learning analytics to their full potential, educators need to first remind themselves of the difference between analytics and the basic reporting that many kinds of educational software provide. Filtering, sorting, and summarizing data about student performance won’t by itself offer insight about opportunities for improvement, nor does it drill down to actual learning outcomes.

Research at Carnegie Mellon University explored how scientifically based, classroom-tested course materials could help enact instruction online in the absence of a formal instructor. One result of that research, according to Benny Johnson, Ph.D., Director of Research and Development at Acrobatiq, an adaptive learning software company spun off from Carnegie Mellon, was courseware grounded in sound learning science and powered by
real-time statistical modeling of individual learning performance. This statistical model produces highly accurate estimates about student learning progress measured against a set of clearly defined outcomes.

Johnson says that data reports in previous generations of online learning software normally relay information such as how many assignments a student completed and what their scores were. But analytics provide educators with actionable information, such as the particular learning objectives a student is performing poorly on and some reasons why.

“Basic reports are not necessarily going to provide the information that’s the most useful,” Johnson adds. “Analytics provides things that would be more actionable — if you knew this, you could take action on it.”

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By revealing patterns, learning analytics opens up immediate opportunities for improvement not only by educators but also for students. For example:

- The student can see what they have learned, what they have left to learn, and where they need to focus. They are getting timely feedback, rather than waiting for end-of-semester assessments, and they are getting targeted feedback tied to the course objectives.
- The teachers, instructional designers, and teaching assistants can see what topics students are mastering, where they are struggling, and what topics should be reviewed. They know what adjustments to make that can have an impact before the next unit rather than during the next semester.
- Institutional administrators get granular data about how much students are actually learning that can inform retention and persistence efforts and, by extension, degree or credential completion.

However, for educators to truly get the most out of learning analytics, Johnson says they need to be educated on how to use it so they can get good results. He says this goes back to developers of online learning platforms designing features that are driven by analytics and that present the results to instructors in a way that makes its value clear.

“We can’t just dump an analytics tool on an instructor and expect them to start using it effectively,” he explains. “It’s up to us to serve reports for them that have the most value.”

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Adapting teaching to adaptive learning

According to Gates Bryant, Partner at Tyton Partners, an education technology consulting and investment firm in Boston, as learning analytics provides educators with data and information they may not previously have had access to, their teaching practice is evolving, leading to what he calls the “birth of adaptive teaching.”

“Analytics in and of itself has little value,” he explains. “It’s what the analytics are telling you as a student or faculty person or administrator. What are those analytics telling you to do differently than what you did before? Analytics without action is empty.”

Bryant says educators need support from institutional leaders during this process, and he sees some barriers to all institutions embracing adaptive teaching. For instance, he says some faculty are disappointed in the standard online learning experience and tools that they currently use.

“It’s hard to ask faculty to engage with data, to make use of it and take actions from analytics, when the core product experience doesn’t meet their own expectations around what an online learning experience should be,” he explains.

“We see there being a really important need for a dramatic re-envisioning of what an online learning experience needs to look like. Then, as a result, more valuable data streams will be created for both students and instructors to engage with.”

Bryant says one factor limiting the potential of adaptive learning is a mindset that sees it as a tool or an engaging activity but not as core to the instructional process. “Faculty get hung up and they see an adaptive learning tool that provides some analytics as just sort of like an extra homework assignment,” he says.

“Thinking about these tools in a more comprehensive way is really where you see faculty making changes to how they think about teaching their courses.”

Aiming for mastery

One educator who has embraced the use of learning analytics as a tool for rethinking course structure is Erik Moody, Assistant Professor in the Psychology Department of the School of Social and Behavioral Sciences at Marist College in Poughkeepsie, New York. For the past four semesters, Moody has used Acrobatiq smart courseware for his Introduction to Psychology course, which he says has changed the way he teaches his class due to insight that learning analytics provides him on each individual student.

The information shows which items students struggled with the most so he can address those particular areas when the class meets in person. “I also tell them these are exactly the items that you’re likely to have presented to you on the exam,” he says.
“It’s the content that students have demonstrated to be the most difficult that I’m going to force them to revisit until they demonstrate mastery, and I can use analytics to identify that content.”

Having access to learning analytics also helps Moody when constructing his syllabus for the class to ensure students have adequate exposure to different concepts. “For the most challenging content, there are at least five occasions in which I am creating an opportunity for them to interact with that material,” he adds. “That in and of itself has changed the way I’ve structured how they’re exposed to the content.”

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Expanding affordability, access, and quality

So how will learning analytics continue to help online learning grow in higher education?

Bryant believes the use of learning analytics will grow as more educators see their peer institutions adopting the technology and as universities and colleges begin to understand how analytics can help with the challenges they face around cost, access, and quality.

“Analytics has the potential to address in different ways all three of those untrackable trade-offs that institutions face,” he says. “Analytics enables faculty to tailor their teaching to the needs of students in ways that were previously not possible without technology. In time we will see analytics enable institutions to deliver quality learning experiences to more students, opening up access without sacrificing quality.”

And as learning analytics technology becomes more sophisticated, Johnson sees it being able to be used to predict which students in a class are at high risk for failing the course based on early performance — just three to four weeks in — and using less obvious information.

“Research shows if we can intervene with students in a judicious way, that makes a difference,” Johnson says.

The 2015 Online Report Card that showed how much online education is growing and how confident many education leaders are it also showed there’s still room for improvement. For instance, the number of chief academic leaders who say online learning is crucial to their long-term strategy declined to 63.3 percent in 2015 from 70.8 percent in 2014. And only 29.1 percent of academic leaders stated their faculty accept the “value and legitimacy of online education.” The good news is that well-designed online learning experiences, combined with leading-edge analytics capabilities that provide deeper insights about student learning and performance, hold great promise for improving learning outcomes at scale.

Corrie Pelc is a freelance writer and editor specializing in trade and B2B publications and in education technology.

About us

Acrobatiq is a learning optimization and analytics company backed by Carnegie Mellon University, helping educators and academic leaders develop, deliver, and continually improve high quality and instructionally effective online learning programs and degrees.

Building on CMU’s historic strengths in learning science, and the Open Learning Initiative’s evidence-based research in online learning, Acrobatiq’s adaptive learning platform, professional services, and portfolio of Smart Courseware enable the rapid development and cost-effective delivery of online learning that adapts to the needs of each learner. Predictive insights generated from student learning data provide educators and other key stakeholders — in real time — with detailed information about which learners need help, and where, so more students can excel at learning, no matter where they start.

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For more information on how Acrobatiq personalizes learning for students, or to request a meeting with an Acrobatiq representative, please visit us online at www.acrobatiq.com