Learning Analytics
A Report on the ELI Focus Session

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Abstract
On April 11 and 12, 2012, the ELI teaching and learning community gathered for an online focus session on learning analytics (LA). This white paper is a synthesis of the key ideas, themes, and concepts that emerged from those sessions. This white paper also includes links to supporting focus session materials, recordings, and resources. It represents a harvesting of the key elements that we, as a teaching and learning community, need to keep in mind as we work to explore how LA can be helpful for instructors (regarding learning activities and course design), for students (regarding progress), and for administrators (regarding course and degree completion data).
Introduction

On April 11 and 12, 2012, the ELI teaching and learning community gathered for an online focus session on learning analytics (LA). This white paper is a synthesis of the key ideas, themes, and concepts that emerged from those sessions. This white paper also includes links to supporting focus session materials, recordings, and resources. It represents a harvesting of the key elements that we, as a teaching and learning community, need to keep in mind as we work to explore how LA can be helpful for instructors (regarding student activities and course design), for students (regarding progress), and for administrators (regarding course and degree completion data).

Learning Analytics: Definitions

Generically defined, analytics is the use of data, statistical analysis, and explanatory and predictive models to gain insights and act on complex issues. As a genre of analytics, LA entails the collection and analysis of data about learners. This data can be of two types. The first is the data that learners generate as they participate in the course. These digital footprints, or digital breadcrumbs, are the evidence that enables the analysis. Secondly, in some learning analytics applications, learner-generated data are supplemented or augmented by data about the learner, such as previous coursework, demographics, and other data that might exist in the student information system.

Once collected, the data are analyzed to detect patterns and make predictions based on those patterns. The goal of the analysis is to discover the trajectory of the learner’s activity and to make predictions about outcomes. There is a comparison at the heart of such analysis, which could be a comparison of the individual’s activity compared to that of the rest of the class, compared to that of students who have taken the course before, or even to how that learner has performed in previous courses. There are also strands of learning analytics that compare a learner’s artifacts against a rubric; for example, using a semantics rubric to analyze a learner’s writing to form an indication of whether their thinking is moving to an appropriate level of expertise.

The goal of the analysis and the information it provides is to enable decision making. Research on learning has shown that it is important to involve students in decisions about their learning, and learning analytics systems that present reports to students enable precisely that. Hence, LA has the potential to strongly support the metacognitive dimension of learning, encouraging the learner to assume more responsibility for his or her learning. Obviously, LA can also be a resource for instructors, providing information in real time about how students are faring. In this way, LA can benefit students and instructors alike.

To sum up, LA

* is the analysis of many kinds of learner-produced and learner-related data;
* seeks to monitor learner activity and progress and to predict learner outcomes; and
* enables interventions and decision making about learning by instructors and students.

Focus Session Themes

As is customary for ELI focus sessions, we divided the broad topic into themes or subtopics:

* LA as sensemaking and its future directions (George Siemens and Simon Buckingham Shum)
* Faculty and institutional issues (John Fritz, Tom Cavanagh, and Chuck Dzuiban)
* Privacy and ethical issues (John Campbell)
Institutional requirements and readiness (Vernon Smith)
LMS perspectives (Don Norris, Al Essa, and Jim Chalex)

The project rounds for this focus session covered these dimensions of LA:

- Course design and student success (Byron Roush and Russ Little)
- Predictive modeling (Sebastian Diaz and Leah Macfadyen)
- Improving student success and retention (Josh Baron and Clint McElroy)
- Course-based learning analytics (Chris Brooks and Brian McNely)

The ELI Community and Learning Analytics

In an effort to inform the LA focus session, we surveyed participants to collect information from the teaching and learning community about their experiences and interest in the topic. Not surprisingly, results showed analytics is still an area of early exploration for most, with 83% just beginning to investigate LA and 46% learning about it but with no current project under way. It is one of the focus sessions’ goals to help support attendees in their learning along the theme. In the area of LA, participants identified several areas of interest:

- Understand what helps students succeed in online instructional programs; understand how to use analytics to improve programming and course design and then to apply this to promote student success in face-to-face courses
- Understand the perspectives of others who have started down this path and get practical advice in general on how to begin
- Learn to use tools to assist with extracting data, analyzing data, determining patterns to seek from the data, and maximizing what is available to support faculty members, students, and administrators
- Identify a process for how to engage the faculty in examining student outcomes from analytics
- Understand how to prepare the institution and the faculty for this type of change
- Find/define a small project that would work for a start and to learn more about stakeholders involved in such projects, their concerns, and constraints.

Several participants noted that some LA functionality or a module was soon to be added to their learning management system (LMS), and they were eager to learn of the affordances this new tool would enable.

Sensemaking: Beyond Analytics as a Technical Activity

To open the focus session, George Siemens spoke on the theme of sensemaking, suggesting that the true role of LA is to support sensemaking and not to supplant it. In a superficial view, he said, "the tools and techniques of analytics are often seen as the intent of analytics." That is, they are taken as conclusions instead of being taken for what they really are, which is evidence. If that happens, it would be a classic case of mistaking the means for the ends.

Sensemaking begins with and relies upon evidence. Siemens reminded us that we are quite skilled at sensemaking on the basis of evidence. Learning is an inherently social process and therefore is complex and multidimensional. Even the best evidence about learning will still require interpretation, which entails analysis of the evidence with a full view of the learning context. Sensemaking is another way of saying “decision making.” LA does not make decisions; it enables them.

If LA is the collection and analysis of data with the goal of producing evidence, then, as Siemens suggested, “all the important stuff with analytics happens…after we’ve done the analytics.” LA does
not relieve us of the responsibility and the need to do sensemaking. The danger is that we tend to “easily acquiesce to technical systems,” to permit our thinking to shut down once we have received the computer’s reports. Far from turning things off, the output of LA “should lead to new ways of thinking and acting.”

To be effective, learning analytics must be based on an iterative looping. Siemens presented a model for the analytics cycle, entailing the following:

- The collection and acquisition of data, guided by the overall purpose
- The storage of the data
- The cleaning or regularizing of the data
- The integration of data into coherent data sets
- The analysis of the data
- The reporting and visualization of the analysis
- The actions that are enabled by the evidence contained in the reports

Focus Session Resources

- “Sensemaking: Beyond Analytics as a Technical Activity,” George Siemens, Associate Director, Technology Enhanced Knowledge Research Institute, Athabasca University. Full session video recording and presentation materials: http://educause.adobeconnect.com/p682d7bpzqd/
- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Projects: Course Design and Student Success

The focus session contained eight examples—each set along a different theme—of institutions that had implemented some form of learning analytics in their instructional environments. The first set of examples focused on course design and student success. Institutions collect data around various tools, and in the first project round that tool was lecture capture, with the goals of improving course design, supporting faculty members in the effective use of the tool, and assisting students in acquiring the skills necessary in their subject matter and in retaining knowledge from their didactic courses. Students received “adaptive release” messages from their LMS based on midterm scores. Those scoring below a certain level were encouraged to review specific lectures.

In his findings, Byron noted that students had an extremely positive reaction to the tool, especially when it enabled them to view lectures when certain events occurred: extreme weather, holidays, or critical deadlines and exams in other courses. In this example, learning analytics was used in conjunction with grade data and activity reports from the LMS to send customized messages, intervene, and support students who needed review and/or had special needs.

The second project was on the use of student success plan (SSP), a software system and process designed to increase the persistence, success, and graduation rates of targeted students at Sinclair Community College. Through various tools, the system collects data that are then used to support the following goals:

- Improve at-risk student retention and success
- Increase the graduation rate of at-risk students
Implement a systematic, comprehensive counseling and intervention process

Implement an integrated early-alert intervention process

Develop and maintain a comprehensive resource of community and college referral sources for addressing challenges to student success and retention

Develop a web-based counseling record (case) management system

Remove silos between offices that support students

Create self-help tools to connect students to resources that help them overcome challenges to their success

At Sinclair Community College, use of the tools resulted in students’ increased likelihood to complete more courses successfully, having higher first-term success rates, increased likelihood to return the following term, and increased likelihood to graduate.

It is important to note that these outcomes, in part, were achieved with a robust case-management approach that involved faculty members, advisors, and the students themselves. The process also involved a feedback loop where results were communicated back to faculty members to acknowledge the time they invested and also to convey the results of the intervention. The system also connects and tracks various resources and touch points used on campus, reducing silos and forming a better picture of students’ needs.

One observation from this set of projects is that successful use of LA to support retention and students requires a somewhat high-touch approach. One presenter noted that faculty at his institution make phone calls to students who are struggling and that they have separate technology and instructional support services available. Institutions might consider whether they are resourced to provide this kind of support and what models (intervention by whom and at what point) are affordable but also effective.

Focus Session Resources

- “Learning Analytics Impact Upon Course Design and Student Support Services,” Byron Roush, Manager of Instructional Services, Ohio State University College of Nursing. Full session video recording and presentation materials: http://www.educause.edu/ELI124/Program/GS02A

- “Student Success Plan: Improving Retention and Success with Open-Source Software,” Russ Little, Manager, Web Systems at Sinclair Community College. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GE02B.

- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Learning Analytics and Faculty Development

Learning analytics has the potential to benefit not just students but also instructors. John Fritz, assistant vice president for instructional technology and new media at the University of Maryland, Baltimore County (UMBC), spoke on this theme. UMBC has put in place a learning analytics tool called Check My Activity, a reporting system for students that indicates their level of course resource usage compared to the course average.

Fritz emphasized the importance of knowing the limitations of LA and the best ways to use what a learning analytics system reports. According to Fritz, an LA application does not measure learning.
But if you accept the idea that activity can be a proxy for engagement, then learning analytics can be a very useful tool. The LMS is a very important source of data that measures and describes student activity. As Fritz put it, “The LMS doesn’t make good students, but it is of importance to know how good students use the LMS.”

LA can also be a tool for faculty, helping them make decisions about course tactics and design. Fritz related the story of an instructor in economics who, in 2010, substantially changed his teaching methods, incorporating adaptive release and a hybrid course model. The success of these changes was not immediately apparent, as the instructor’s immediate evaluations went down. But the students who graduated from his course, on average, scored a half grade point higher in their follow-on course and did 20% better on the department’s common final exam. Analysis made it possible to cast this wide net and perceive the ramifications of this instructor’s changes.

Changing teaching styles is stressful, and the transition can be assisted by analytics. Hence, LA is most useful as a tool to help identify best practices for both students and faculty. In terms of faculty support, it can help identify the best practices and enable support staff to put them “in front” of other instructors, in the hope that those practices will diffuse more quickly. Learning analytics has the potential to help both students and faculty answer the question “How am I doing?”

Focus Session Resources

- “Using Learner Analytics to Identify and Promote Effective Teaching Practices,” John Fritz, Asst. VP, Instructional Technology and New Media, UMBC Division of Information Technology. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS03
- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.
- UMBC’s Check My Activity module: http://www.umbc.edu/blackboard/reports

Projects: Predictive Modeling

The second set of project rounds focused on predictive modeling. In the first session, we heard about an ongoing data-mining effort, which was kicked off last year with a $1 million grant from the Bill & Melinda Gates Foundation and led by the WICHE Cooperative for Educational Technologies. In this program, researchers have created a database that measures 33 variables for the online coursework of 640,000 students, totaling 3 million course-level records. Six large institutions are participating in this study (American Public University System, Community College System of Colorado, Rio Salado...
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College, University of Hawaii System, University of Illinois–Springfield, and University of Phoenix), in which variables have been identified that help track student performance and retention across a broad range of demographic factors. This project investigates various research questions and areas:

- What factors influence student loss/retention and momentum/completion?
- How do the factors affecting loss differ from indicators of completion?
- What can we discover about the existence of unique demographic, pedagogical, or institutional factors affecting loss/retention and momentum/completion?

The data in this cross-institutional project can show what works at a specific type of institution and what doesn’t. For instance, the research shows that taking several courses concurrently, early in students’ programs, significantly reduces the chances that at-risk students will be successful. For all other types of students (those not at risk) there is an incredible degree of complexity in predicting success. The study also found that learner characteristics, course characteristics, and support characteristics were significant factors that affected predictive analytics reporting.

For researchers in the predictive analysis space, it will be important to consider all the different types of analyses that can be done—the possibilities are nearly endless. This work could help identify patterns and findings that might not otherwise be evident with smaller data sets and could therefore result in more productive student success research for individual institutions. Of note, some trends manifested themselves across institutions, while others were specific to the individual or the institutional type. Interinstitutional comparisons, made possible by sharing data, begins to tell us what is unique about student populations and may help us serve their unique needs better in the future.

The project’s researchers have already achieved one of their primary goals: to show they could create a large, workable database. Moving forward they will continue to study the data and expand the number of institutions participating, perhaps by as many as 18.

The second session in this set focused on the use of LMS tracking data for predicting student achievement. Leah Macfadyen, evaluation and learning analytics manager at the University of British Colombia, aptly pointed out that traditional summative assessments typically occur too late and offer limited insight into student learning practices, student study strategies, the development (or not) of effective learning communities, the degree of student engagement with peers and course materials, and what absent/disengaged students are doing (or not doing). Working with LMS data, however, presents some significant challenges:

- Getting access to the data.
- Finding the meaningful variables. The presenter noted that hundreds of variables are available but that only 13 had any correlation to student final grades at her institution.
- Realizing that students are not univariate actors. Students engage in various activities related to learning, making it difficult to arrive at definitive conclusions, especially for the middle band of students, as opposed to the high- and low-performing students.
- Including course design—which varies from course to course—in predictive models.
- Understanding how learning is measured, aside from the final course grade.

Other factors influencing the significance of selected LMS tracking variables include the way the LMS is implemented, whether the LMS or tools contained therein are required or optional, whether online activities are required or optional, whether online activities are graded, relative proportions of required online versus offline work, and the course mode (online/blended/web-supported). So, while the LMS
may be a starting point for much early LA work, learning is a complex and highly contextualized activity, and these challenges are significant and worth exploring at the outset.

Focus Session Resources

- “The Predictive Analytics Reporting Framework,” Sebastián Díaz, Associate Professor, West Virginia University, College of Human Resources & Education. Full session video recording and presentation materials: http://www.educause.edu/ELI124/Program/GS04A
- “LMS Data and Student Achievement: Which Variables Are Meaningful?” Leah P. Macfadyen, Manager, Evaluation and Learning Analytics, Arts ISIT, The University of British Columbia. Full session video recording and presentation materials: http://www.educause.edu/ELI124/Program/GS04B
- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Analytics That Inform the University

Analytics can leverage data across an entire institution and can inform strategy, planning, and resource allocation. At the University of Central Florida, where online programs have grown significantly over the past eight years, the employment of LA has enabled UCF to better track the effect of its faculty development efforts, to ask more and better questions about student success, and to shape its enrollment and course offerings, among other things. Constantly tracking student performance across institutions in all course types has enabled UCF to monitor progress and, more importantly, to be able to talk to faculty members and students about the effect of delivery mode on learning. UCF is also exploring and fostering a macro culture where faculty members are the primary directors of what happens in interacting with and supporting their students.

In the future, UCF hopes to continue to refine the data to cultivate a higher level of accuracy and to work with faculty members and students to develop a culture and ideas on how to better leverage what they’re learning. The cultivation and deployment of actionable analytics is a central concept and goal to keep in mind as one begins these efforts.

Focus Session Resources

- “Analytics that Inform the University,” Thomas B. Cavanagh, Assistant Vice President, Distributed Learning, and Chuck D. Dziuban, Director, Research Initiative for Teaching Effectiveness, Center for Distributed Learning, University of Central Florida. Full session video recording and presentation materials: http://www.educause.edu/ELI124/Program/GS06
- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Ethics and the Obligation of Knowing

Discussions about learning analytics almost always bring up the issues of privacy and ethical responsibility. It could be argued that LA is tantamount to snooping, to invading the privacy of our students. It could be further argued that the information revealed by an analytics system places a responsibility on the institution to act on that information, similar to a physician receiving a report about a patient.
Addressing this topic, John Campbell of Purdue University gave a presentation on the ethics of data collection and analytics. Campbell identified two key questions involved in LA in this respect:

- Who decides what data is collected and by whom?
- Once data is collected, what are the institution’s obligations to use it?

The need to collect and analyze our data is clear. In the absence of objective reports and analysis, we often don’t know what the impact is of our current investments and activity. Students tend to oversimplify their progress or regard it more optimistically than circumstances warrant. Faculty members do their best to deliver good instruction, but data are limited. In the past, we have lacked a timely, data-driven understanding of how our activities are impacting student success. The Course Signals program at Purdue has produced results that make it clear that an analytics application can contribute, in some cases powerfully, to academic success.

Implementing LA creates a strong incentive for institutions to develop policies about data-collection and interventions. There is not a prescribed policy that would work for all institutions. Policies on data collection and interventions need to reflect each campus’s culture, goals, and aspirations. So while it’s not possible or advisable to dictate what a policy should be, Campbell offered some guidelines for the process for formulating such policies:

- Keep the scope manageable; don’t try to cover all aspects on the basis of a single or initial project.
- Use transparency to foster trust.
- Work with the institutional review board (IRB).
- Include diverse participation in the discussions and deliberations.

Additional considerations when working on a learning analytics policy include the following:

- Should students be able to opt out? While that would avoid the perception that Big Brother is always at work, the result could be that the students who would most benefit would elect to opt out. In addition, reducing the data set size would make it more challenging to produce analysis results and identify patterns that would inspire confidence.
- FERPA grants some latitude to institutions on the use of student data, on the basis of “educational need.” The scope of such latitude needs to be an explicit part of the policy discussion.
- If you do produce actionable intelligence, it will be important to define whose responsibility it is to act and what the range of those actions needs to be. In many of the reports in the focus session, institutions have not needed to introduce a thick new layer of intervention services because highlighting current support services to students often provides a sufficient response.

**Focus Session Resources**

- “The Obligation of Knowing: Ethics of Data Collection and Analytics,” John Campbell, Associate Vice President for Academic Technologies at Purdue University. Full session video recording and presentation materials: [http://www.educause.edu/events/ELI124/GS07](http://www.educause.edu/events/ELI124/GS07)
- Presentation slides and resources for all sessions can be found at [http://www.educause.edu/Resources/Browse/ELISF12/43869](http://www.educause.edu/Resources/Browse/ELISF12/43869).
Starting from Scratch: Building Your Learner Analytic Capacity

Vernon Smith described a five-step technical process outlined in Campbell and Oblinger (2007; see resource list for article) to begin learning analytics work (capture, report, predict, act, and refine), though he added an additional first step—charter. Smith explained that establishing a charter for an LA initiative addresses three fundamental issues:

- Determining whether an institution could learn about at-risk behaviors, student outcomes, and early interventions from learning analytics
- Identifying all the places where the data to answer these questions resided
- Establishing a process to get the faculty involved and to develop a continuous quality improvement culture

In the first predictive model Smith described in his presentation, Rio Salado College:

- Ran the data on eighth day of class, derived estimated probability of student success, and generated corresponding warning levels describing students’ risk of failure: low, moderate, and high
- Identified 30 behavioral factors covering a broad spectrum of LMS behavioral data and enrollment information
- Identified a methodology: the Naïve Bayes classification model
- Determined the model’s level of accuracy: 70% of unsuccessful students (success defined as C or higher) were correctly predicted for six participating disciplines. Warning levels correlated with course outcome.

Several other factors were used in the methodology, such as login frequency, site engagement, points earned, points submitted, and current credit load. Although all these factors were significant, credit load was significantly associated with student success, and students were positively responsive to intervention, such as an instructor phone call to check in.

Several important lessons were learned in this process:

- Analytics is not just a tool but also a business and change process, and as such, it’s useful to consider successful organizational approaches to change, such as the one described in Kotter’s model (http://www.kotterinternational.com/kotterprinciples).
- Involve all constituents at the same rate and at the same time to avoid missteps.
- Consider all the different roles that need to be present for successful predictive modeling (e.g., project champion/institutional support, stakeholders, IT department, predictive modeler, and a programmer/analyst).

Focus Session Resources

- “Starting from Scratch—Building Your Learner Analytic Capacity,” Vernon C. Smith, Chief Academic Officer and Provost, MyCollege Foundation. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS08
- Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.
Projects: Improving Student Success and Retention

Josh Baron, senior academic technology officer at Marist College, reported on the Open Academic Analytics Initiative (OAAI), a project that has received support from Next Generation Learning Challenges (NGLC). The goal of the OAAI is to employ analytical software to find patterns in "big data" sets as a means to predict student success. Using data from both the student information system and the LMS, the project's goal is to create an open-source early-alert system that will (1) identify at-risk students in the first two to three weeks of a course and will (2) enable the deployment of interventions to assist those students to succeed. The LMS that Marist is working with is the Sakai Collaboration and Learning Environment. The other two major components of OAAI are the Pentaho Business Intelligence Suite and the OAAI Predictive Model, which uses Predictive Modeling Markup Language.

To date, the beta version of the Sakai Academic Alert system has been released. The system has been piloted with 36 courses at community colleges and historically black colleges and universities. The other dimension of Marist College’s project is its Online Academic Support Environment (OASE). This is Marist’s intervention framework, which makes a variety of resources available to students to help them achieve academic success. OASE has three frames:

- Learner/content interactions, including self-assessment instruments; OER for remediation (e.g., Khan Academy), and OER content for improving learning skills.
- Learner/facilitator interactions. This is a kind of routing service, directing students to resources, people, and services.
- Learner/mentor interactions. These are online interactions with peer mentors and include an online student lounge and blogs for students to reflect on experiences.

Most of the resources developed for OAAI and OASE are available under a Creative Commons license.

Clint McElroy, dean of retention services at Central Piedmont Community College, reported on the work CPCC has done on its Online Student Profile Learning System (OSPLS), which has received support from NGLC. This system was developed as a response to the following challenges:

- Students who are academically underprepared for college tend to be psychologically and socially underprepared as well.
- The vast majority of college faculty members have had little or no formal training in teaching/learning strategies.
- Faculty, counselors, and advisors often have no online access to “personalized” student information.
- Records of student advising and counseling contacts were not shared online, making every meeting with a new advisor or counselor a “start from scratch” meeting.

To meet these challenges the OSPLS was built, consisting of three major components:

- An improved student services model, with new and expanded services (such as student success centers across campus), self-assessment resources (such as learning and personality inventories), and a comprehensive orientation course.
- Resources to enhance faculty skills, with a faculty training series.
• An online student tracking system, with a profile for each student and an early-warning system. This system is not automated but rather is faculty driven.

The Online Student Profile (OSP) gathers information about the student (survey data, learning style, personality type) and makes it easy to access for advisors and instructors. This file accompanies the student as he or she progresses and includes alerts and advising notes history.

Faculty can access a kind of dashboard that summarizes key student information, including personality type and learning style. From this point, faculty can initiate contact with any student or request an intervention. Students also have a dashboard that offers information to help them make decisions about their coursework.

Since the implementation of this system, CPCC has seen significant gains for in-term retention rates as well as increased success in developmental courses (for example, students are 8.7% more likely to complete the courses in which they enrolled). CPCC has also seen changes in instruction, with instructors more likely to assign oral presentations and active course projects.

The support that CPCC has received from NGLC has enabled it to share its system with six other institutions, among them Lane Community College, Monroe Community College, and Moraine Valley Community College.

Focus Session Resources

• “Open Academic Analytics Initiative: Leveraging Openness to Improve Learner Success,” Josh Baron, Director of Academic Technology and eLearning, Marist College. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS09A

• “The Online Student Profile Learning System: A Learner-Centered Approach to Learning Analytics,” Clint McElroy, Dean, Retention Services, Central Piedmont Community College. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS09B

• Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.


The LMS Perspective

Because it is a rich source of data about student activity, the LMS plays a key role for learning analytics. ELI invited representatives from leading LMS companies and an expert consultant on LA to participate in an interview-format discussion of LA. Joining the focus session for the discussion were:

- Jim Chalex, product manager with Blackboard Learn for Outcomes Assessment
- Alfred Essa, director for innovations and analytics at Desire2Learn
- Donald Norris, president and founder of Strategic Initiatives, Inc.

Below is a summary of some of the key points our experts made; please access the recording of the session for a complete account.

How would you define “learning analytics”?

JC: Analytics, broadly, is the methodical collection and analysis of data to improve efficiency. Learning analytics is focused on the individual learner and his or her context, as well as on those who support the learner, such as instructors and advisors.

AE: Learning analytics has four dimensions: (1) empirical science of learning; (2) machine intelligence, enabling heuristic reasoning and discovery; (3) statistical reasoning, which is reasoning from incomplete data; and (4) optimization of current processes and procedures.

DN: Another dimension is optimizing student success in academics in the broadest sense, including formal learning contexts (within a course and with an instructor), “free-range” learning (individually or with peers), and outside the institution.

What kinds of data are most relevant and important?

JC: Depends largely on what constitutes student success. There’s value in blending a variety of data types such as the number and timeliness of interactions; submission of coursework; extent and number of interactions with course material; formative and summative assessment results.

AE: There is no “one size fits all” answer. There are two main dimensions for this data: personal, more static data (e.g., gender, family income) and behavioral data (what the learner does). Dispositional data as well; people’s ability to self-regulate can tell us a lot about their wellness and ability to learn, and there are techniques to pick this up.

DN: One needs to take a smorgasbord approach, blending various kinds of data is key, such as being on task, levels of engagement, and not falling behind.

Is there a role for qualitative data?

All three: Yes, especially on the student services side. The solution from Starfish includes case management tools to support the quality and consistency of interventions. Another tool is the e-portfolio, both as a data source and a data repository.

What will learning analytics look like two to three years from now?

JC: Schools will have gotten up to speed and have at least the foundation in place. There will be ways to measure interaction with course content such as textbooks and other course materials, particularly OER. We might well see reporting in natural language, making the results of the analysis more accessible.
AE: Learning analytics will be serving the democratization of learning by helping more of the at-risk students succeed.

DN: We’ll be seeing more interinstitutional sharing of anonymized data to broaden the scope and depth of the analysis. Learning analytics services from the cloud will also be much more prominent.

Focus Session Resources
• “Learning Analytics: The LMS Perspective,” Don Norris, Partner, Strategic Initiatives; Jim Chalex, Director, Product Management, Blackboard Analytics; Alfred Essa, Director of Innovation, Analytics Strategy, Desire2Learn Incorporated. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS10
• Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Projects: Course-Based Analytics
The first session in this set of projects focused on the role of the instructional designer when real-time analytics is available to students during an active course. In his talk, Chris Brooks, research assistant at the University of Saskatchewan, proposed a rapid instructional design process that is agile and addresses immediate findings or deficiencies that may be addressed by course design. In other words, he proposed “micro interventions” where a designer is enabled to support students just in time, with a staffing model that includes an instructional designer, using a descriptive course dashboard, for a certain number of students in a given course.

Rapid prototyping of interventions has several benefits if properly constructed. By the time new instruction is developed and tested, students have withdrawn. As a result, rapidly deployed, smaller-scale interventions that can be easily measured are more desirable. Frequent formative and summative assessment is critical to this process to alert the designer of issues as early in the course as possible. Watch for changes in determinants of learning as opposed to just evaluations. Look for uniqueness inside every course because each class and its students are unique, and analytics data should show how. Address the opportunities that will have the most significant impact on student learning first because time and resources are limited. Finally, empowering instructional designers to support students can afford institutions the ability to scale up their intervention efforts, which is frequently a challenge.

The second project is a case study on the application of learning analytics on the collaborative construction of knowledge and writing. This project posed two questions: Does learning analytics related to collaborative writing foster greater metacognition and thus greater learning among students? And, does such analytics data promote both instructor and peer opportunities for real-time interventions as formative assessment? In conjunction with the use of Google Docs, this project developed a system that generates visualizations of real-time metrics of edit histories of collaboratively written documents. Making this information available to the collaborators, they hoped, would lead to improved metacognition. Three interrelated findings emerged from this study:

• Regarding the collaborative processes of learners, they preferred co-located, face-to-face writing and, at least in this case, did not take full advantage of the benefits the technology afforded them.
• Edit histories were frequently made by a designated writer within the groups, so many interactions were ephemeral and uncaptured in the data, thus highlighting one of the challenges of using LA in this type of learning situation.
• These two findings contributed to a larger conclusion: There is a need to reexamine the kinds of practices that contribute to final written deliverables, the construction of knowledge, and learning. The real benefit of monitoring collaborative writing via LA may need to take place in a different environment—such as in a learning environment that is fully online, with large, distributed collaborative teams, and where there are complex, ongoing, multicontributor deliverables.

Focus Session Resources

• “Instructional Design in the Age of Learning Analytics,” Chris Brooks, Research Assistant, Advanced Research in Intelligent Educational Systems laboratory, Department of Computer Science, University of Saskatchewan. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS12A
• “Learning Analytics for Collaborative Writing: A Prototype and Case Study,” Brian J. McNely, Assistant Professor, Department of English, Fellow, Emerging Media Initiative, Ball State University. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS12B
• Presentation slides and resources for all sessions can be found at http://www.educause.edu/Resources/Browse/ELISF12/43869.

Learning Analytics: Dream or Nightmare?

The focus session concluded with a presentation from Simon Buckingham Shum of the Open University entitled “Learning Analytics: Dream or Nightmare?” The presentation was, first, a meditation on the best or genuine role of LA in higher education and, second, a look at some future directions.

The legitimate role for LA was perhaps best summarized by this statement on Shum’s final slide: “Learning analytics should provide mirrors for learners to become more reflective, and less dependent.” A danger for LA is that it could be interpreted in superficial or overly simplistic ways to fulfill agendas unrelated to student learning. As an example, Shum related the practice in the United Kingdom of using results from standardized achievement scores as indicators of student learning. These scores are then used as the basis for hiring and firing decisions for headmasters. Such mono-dimensional analysis misses many aspects of each student’s story. Simplifications assist neither students nor teachers in furthering learning. This echoes a point made by many of the focus session presenters: Learning analytics is not a measure of learning but rather is a tool best used by students and instructors to help make decisions about learning.

While analytics has much potential, it is susceptible to computational reductionism and “big data” hubris. Boyd and Crawford have articulated six cautions or provocations with respect to the use of big data. The fact that large quantities of data are a part of an analytics project does not guarantee objectivity, adequacy, and accuracy. We should not lose sight of the fact that analysis of data is still interpretation of data.

Shum urged a wider view of LA and urged focus session participants to explore ways to augment simple counting of clicks and logins to systems that will assist learners to acquire higher-order learning skills, such as critical questioning, creativity, metacognition, and motivation.
Focus Session Resources

- “Learning Analytics: Dream or Nightmare?” Simon Buckingham Shum, Senior Lecturer and Assoc. Director (Technology), Knowledge Media Institute, Open University UK. Full session video recording and presentation materials: http://www.educause.edu/events/ELI124/GS13.


Learning Analytics: Activities

Part One

Given the topic for this focus session is very much an emergent area, one in which the majority of our participants have little experience or exposure, we thought it worthwhile to construct an activity that helped them get started. In the first part of the activity, we asked participants to tell us both the goals they’d like addressed and the questions that address those goals. For instance, participants could identify increased student retention as a main goal and then unpack the goal into its parts, which in this example could mean retention at specified levels for particular courses in certain academic terms.

Learning Analytics Goals

In response to the first part of the activity, participants identified several primary goals for their initiatives. Below are a few selected responses:

- “We need to identify what “works” in this space. We're still working in small and medium projects to identify what can have a measurable impact on teaching and learning. This work is at a variety of scales including a subset of courses using the LMS, individual courses and utilizing tailored messages to students, student writing across disciplines, etc. In other words, how do we focus the conversation to identify the usable parts of infrastructure so that interesting and useful questions can be asked of the available data?”
Learning Analytics

- “Identify how course design contributes to student success by comparing courses based on Quality Matters or those that have achieved Quality Matters approval to nonapproved Quality Matters courses. For instance, determine what types of learning objects best prepare students for achieving learning objectives, explain how course layout impacts usability, identify the role of faculty interaction on student achievement, measure contributions made by student-student interaction, evaluate the impact of faculty development upon course design, and identify which incentives encourage students to take responsibility for learning.”

- “The specific goal is to improve our standardized statewide courses through the use of learning analytics from Blackboard about our multisection courses. Program chairs are concerned about the evaluation of two factors of consistency across all sections of the course. One is consistent evaluation of instruction, which refers to instructor use of grading rubrics in a consistent and equitable fashion. The other is consistent instruction, which refers to the demonstration of similar instructional behaviors (posting to a discussion board, posting announcements, responding to students) across all sections. The combination of aggregate usage and grade statistics will be used to form the basis for evaluating course sections across these two factors of consistency.”

- “Nurture Faculty Community of Practice to work with learning analytics data to improve teaching.”

- “As I’ve observed, there are conversations and hypotheses—within our institution and the broader two-year college community—regarding the value of offering students a more prescriptive curriculum. The goal is to develop an analytics model that would allow us to determine if there’s a selection and sequence of courses that may be more efficient at helping students complete the AA or AS.”

Most participants identified their LMS as the primary location to begin addressing questions related to effective pedagogy, retention, student engagement, and student success in general. Some are recognizing the need to work collaboratively with faculty members to explore these areas and make recommendations to improve instruction.

**Part Two**

In the second part of the activity, we asked participants to review the five steps of analytics discussed in “Academic Analytics” [http://net.educause.edu/ir/library/pdf/PUB6101.pdf](http://net.educause.edu/ir/library/pdf/PUB6101.pdf) and then, in conjunction with their colleagues, to indicate the following:

- Who are the key stakeholders and partners you need to assemble to move forward with LA work?
- What specific role(s) would each play in a learning analytics project?
- What expertise would they contribute?

We feel this is a critical part of getting started in what is necessarily and truly collaborative work. This activity could easily be adapted for local use and could serve to cultivate some cohesion in developing LA goals for a department or institution and also to assist in identifying all those units or individuals who need to be at the table to move forward.

One of the hopes we have for LA is that it will result in significant changes in the way we structure and deliver curriculum. But do we really have the mechanisms, organizational models, and structures in place to support us in doing that? What really matters is what we do after analytics has been done, whether our institutions are ready to act, and what can be done to support appropriate action.
Learning Analytics: Next Steps

This event provided a snapshot of learning analytics while still in a formative, emergent stage. Prior to this focus session, ELI had issued a brief and conducted several webinars on the topic. Learning analytics was one of the five content anchors for the 2012 ELI Annual Meeting and was also the focus of the ELI Leadership Roundtable at the annual meeting. ELI will actively pursue the topic of learning analytics as this technology develops and matures. In June 2012, ELI will publish a brief summarizing the second Learning Analytics and Knowledge conference.

EDUCAUSE will be conducting a Sprint on the broader subject of analytics in higher education in late July 2012.

Additional Focus Session Content and Related Resources

ELI Focus Sessions (http://www.educause.edu/eli/events) generate a significant amount of content around their themes. We encourage the reuse of this content, which often includes discussion questions, thematic scenarios, speaker recordings, and readings to conduct and facilitate campus events.

Focus Session Content

Content for the 2012 Online Spring Focus Session on learning analytics can be found at http://www.educause.edu/ELI124. Below you will find additional resources, including a reading list and discussion guides.

- Learning Analytics Resource List, includes websites, reports, articles, and research: http://tinyurl.com/learnanalytics
- Learning Analytics Discussion Questions and Activity Workbook, Day 1 and 2: http://www.educause.edu/ELI124/Resources
- Presentation slides and resources for all sessions: http://www.educause.edu/Resources/Browse/ELISF12/43869

Other Related Resources

- Focus Session Learning Commons (for all ELI focus sessions): http://elifocus.ning.com/