LEARNING ANALYTICS: Using Data to Optimize the Learning Experience
Functioning as a collaborative teaching and learning community, E-Learn is a place for educators to share ideas, insights, perspectives, and practices for the purpose of improving student success.

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Share your experience, perspective, or field of expertise through an interview, column, or article. Suggest our next topic of focus, get in touch with the E-Learn team.

Sincerely,
The E-Learn Team

THE TOPIC OF LEARNING ANALYTICS HAS BEEN trending in recent years. Although it is still a growing field, with some countries adopting the technology more quickly than others and some just beginning to discover its possibilities, one thing is for sure: learning analytics is here to stay.

Educational institutions can use learning analytics to turn raw data into actionable insights to achieve results across the entire institution. From administrative staff to faculty and students, this education insight can increase institutional performance and help meet today’s biggest challenges in academia.

At Blackboard, our aim is to continuously provide you with the most current and relevant information about the topics that matter most in education today. Learning analytics promise to engage faculty and students, increase learning outcomes, and improve institutional success. With that in mind, we have put together meaningful information that can help you along this exciting journey.

We begin this issue with a piece featuring Timothy Harfield, Blackboard’s senior product marketing manager, and his thoughts on the challenges and possibilities of learning analytics. As Harfield puts it, learning analytics cannot replace human judgment, but it can inform it.

Find out how institutions can go about interpreting data, the possibilities for instructors, and how to identify institutional barriers.

Discover how Dr. John Whitmer and a team of scientists are developing and enhancing the next wave of data-informed learning environment features that will better serve the educators, learners, and institutions. Get insights on how democratizing analytics can benefit students and teachers, and how institutions, educators and students will engage with this technology in the near future.

Consider the ethical concerns related to learning analytics, explore 10 reasons why higher education institutions should implement learning analytics today, review insights and experiences from experts in three distinct regions, and learn how Concordia University Wisconsin is harnessing the power of learning analytics to identify at-risk students to help them succeed.

We hope you find this information timely and valuable, and as always, we invite all members of the teaching and learning community to share their experiences, best practices, and insights for the benefit of the entire community. If you’re interested in sharing your story, we’d like to hear from you.
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Learning Analytics: Possibilities and Challenges of Using Data Science in Higher Education

Still a young field, learning analytics is being increasingly seen by higher education institutions as a powerful resource to inform decisions and achieve better learning results.

By: Priscila Zigunovas

“WHAT GETS MEASURED GETS MANAGED.” THIS QUOTE, attributed to Peter Drucker, the father of modern management, is often used by analytics researchers and thinkers in reference to the power of data to inform decisions, a practice that many higher education institutions could benefit from.

“In order to effectively manage our systems, our processes and the success of students, we need to have measurement, because with that we have access to information and knowledge that we can use to control particular outcomes,” says Dr. Timothy Harfield, Senior Product Marketing Manager for Blackboard Analytics.

The biggest change in education in recent years has been the increase in scale, which not only impacts the number of people institutions are able to reach, but also limits their ability to engage students face-to-face. Learning analytics can play an important role in this challenge.

“As education becomes increasingly scaled and asynchronous, analytics becomes more important as a tool in support of high-quality teaching and learning practices that are responsive to meet the needs of students in a timely manner,” says Harfield, who has a background in philosophy and sociology and has published extensively on how learning analytics can be used to promote student success along with humanistic values.

However, most institutions are still far from exploring all the possibilities that learning analytics can offer.

Great Expectations

Learning analytics, as a field and as a discipline, is still very young – about six years old. Institutions and researchers are still working with a great deal of experimentation.

Over the past few years, some institutions have invested in learning analytics with great success, while other early adopters were disappointed and are now skeptical about what the field can offer, according to Harfield.
Learning analytics is trending and it seems to offer endless possibilities. Institutions and education professionals can benefit from this powerful technology, as long as they remember that working with data requires human wisdom.

Human Judgment is Still Essential

Analytics is nothing more and nothing less than the visual display of quantitated information, according to Harfield. However, capturing activity in the form of data and transforming that data into visual displays of information, such as tables, charts and graphs, involves human judgment, and institutions have to take that into account.

In the expert’s experience, the institutions that are most effective at working with learning analytics are those with experienced and prudent practitioners who carefully consider the data in the context of deep knowledge about students, institutional practices and cultural factors.

“Learning analytics is not an opportunity for us to stop thinking, assessing and making decisions, but it is an important artifact that needs to be considered along with a variety of other sources of knowledge, including the human wisdom that comes with experience in order to solve particular problems,” Harfield says.

“Analytics is not a replacement for human judgment. It’s a form of information, but it still needs to be interpreted, and that interpretation requires human wisdom.”

Identifying Institutional Barriers

Over time, institutions will be using increasingly more data as a base for their decisions and strategies. A major challenge that they have to face is not to be overwhelmed with the amount of data. That’s why it’s important to invest in structures like data warehouses, so that they have access to data when they need it.

“However, once they have invested in that infrastructure, they need to forget about the data and focus on the questions, such as ‘What are the problems we need to solve as an institution?’,” says Harfield.

He suggests beginning with those inquiries and then thinking about how to translate them into questions that can be answered using the available data, and finally translating that data back into strategies that can actually inform and improve the specific outcomes institutions are looking to achieve.

“Let’s not forget that the university is a very old institution and, as a result, it’s incredibly complex. It can be really challenging to navigate if you are a student,” says Harfield.

The result of that is often a paradox: universities and colleges want students to be successful; however, because of the complexity of these institutions, they often end up including systematic barriers to the success of the very students they want to see succeed.

Analytics can provide the data that institutions need to identify those barriers, and it can positively impact student success but also institutional success and efficiency as well.

“Analytics allows institutions to see themselves almost like in a mirror. It allows them to gain access to how the institution is functioning as a whole and to identify the way in which students are being systematically and disproportionately advantaged or disadvantaged because of how that institution functions,” explains Harfield.
Possibilities for Instructors

A way in which instructors are using analytics to improve their courses is by creating solutions to identify students at risk. This could be automated by using predictive analytics, through Blackboard Predict, and also through tools like the Retention Center in Blackboard Learn 9.1. The later allows faculty to establish a threshold based on factors that they consider important, and also to monitor students as needed.

“This type of access to information about student activity and the consequences of that activity for their success are less important if you are in a small face-to-face class, but it becomes more important as you enter into online courses and large classes, where that face-to-face interaction is lost,” says Harfield.

Proactive advising using predictive analytics is a trend that will be even more present in the future, as it allows instructors and institutions to identify students at risk before they go off-track.

Harfield recalls that the reason why traditional approaches to academic advising increasingly don’t work is because students that are in most need of that advising — usually low income, first generation and minority students — are exactly the ones that are the least likely to actively seek out help from support systems on their own.

“By using predictive analytics, we are able to identify students at risk early, before they fail the class, before they have dropped out,” suggests Harfield. These students can be invited for a conversation with professors, student success professionals, academic advisors or coaches in order for them to understand the potential barriers that students are facing and to develop strategies to help them overcome these difficulties.

Another way in which teachers can use analytics is giving students access to their own information, which fosters a sense of self-regulated learning. Research has found interesting results in that area. John Fritz, from University of Maryland, Baltimore County (UMBC), has found that students who used a feedback tool called “Check my Activity” were 1.92 times more likely to earn a grade C or higher compared to students who didn’t use the tool.1

“Also, I have seen through research that we have done with the University of Michigan that the benefits received by having access to this kind of student-facing analytics disproportionately affects lower performing students. So, it’s actually helping exactly the kind of students we want to help keep on track,” tells Harfield.

From a pedagogical perspective, he explains, learning analytics gives instructors an opportunity to create interesting assignments that require students to, for example, reflect upon the analytics that they are seeing.

“We know that simply presenting information to students doesn’t make a difference in their behavior, but what does have an impact are opportunities to actively reflect on that data and what it means for them,” says Harfield.

Future Perspectives

Although there are still many questions to be answered regarding the use of data in education, there are also several opportunities for pedagogical innovation in the use of learning analytics that instructors, professors, teachers and coaches have yet to explore.

In the future, Harfield says he would like to see more reflection and research done on the most effective way to leverage these new analytic technologies.

“I’m really looking forward to seeing, as technology advances, how we will be able to adapt our strategies, our approaches and our thinking about pedagogy to make the most effective use of those technologies in support of students.”

Learning Analytics Amplifies Quality Teaching

As research and implementation on learning analytics advances, it is possible to catch a glimpse of a future in which data-informed features will become essential to help instructors and students make better decisions.

**Evolution in Data Collection**

Before learning analytics, due to the difficulty accessing behavioral data at scale, the research that campuses conducted about student use of academic technology usually relied on student interviews and surveys, which aren’t always accurate. The response rates are low and the students who respond are a biased sample, often reflecting power users or people with extreme opinions.

The field of learning analytics is creating and applying new statistical techniques to help researchers to deeply understand what is happening in class.

“They give us this new form of knowledge about what happened during a class that allows us to create better learning materials and learning experiences, as well as interact with students while the class is still going on, while there is still time to intervene, maybe even change the success of a student within that same class,” says Whitmer.

**Can Learning Analytics Provide a Formula for Student Success?**

Sometimes the biggest discovery is that a hypothesis cannot be confirmed. One of the most interesting research findings from Whitmer’s team is that, when looking at scale across all courses and institutions, there isn’t a strong relationship between student use of Blackboard Learn (in particular) and their class grade. In fact, there is a very small relationship between the two.

“There is often an assumption in learning analytics that if you could get information about what students do and how frequently they use the platform, then you would have a magic wand that would completely reveal students’ success and factors around student learning. But when we look at it on a large scale, we find that this is not true,” he explains.

Instead, they found that it was important to look deeper into course design and the specific uses of Blackboard Learn. “For example, students that spend a larger amount of time looking at their grades tend to do better than students who spend less time doing that,” says Whitmer.

In classes that use assessments or discussion forums frequently, the amount of time students spend on those activities is directly related to their grade. In the end, what matters most is centered around student effort, pedagogical approaches and instructional practices.
How Can Democratizing Analytics Benefit Teachers and Students?

Educational research is often done by a small group of experts, and historically, the results only circulate around administrative and leadership positions within an institution. These leaders can choose to disseminate the information or not.

"But often teachers and students have a lot of questions, and they are very interested in data and information that can help them make decisions," points out Whitmer. Democratizing analytics means making data and insights accessible to them as well as to other stakeholders that can benefit from it.

Ethics is also something that needs to be carefully considered, according to Whitmer. "That is an important part of what Blackboard does, to ensure that the powerful techniques we can apply are aligned with what we should do in terms of the ethical obligations that we have to students. And those obligations are different around the globe, given different laws and regulations and cultural practices around student data," he says.

How Can a Teacher Begin to Use Learning Analytics?

Fundamentally, learning analytics means that the teacher can study students’ actions and how frequently they access learning materials and activities.

"Before learning analytics, we did not know, or at least we did not know at large scale, what happened while students were in class, how often they studied, how they studied, how often they opened the materials, how they interacted with them," points out Whitmer.

The expert suggests that teachers should start using analytics by identifying the most important questions that they need evidence in order to answer.

"For example, are my most successful students accessing, participating in their learning activities, or are my least successful students not participating in certain types of activities? Looking at those relationships between activity in student learning at a very detailed level, looking at discussion forums, looking at your lecture materials, and reviewing notes, instructors can get a sense of what students are actually doing in their course and how it relates to the success they have," recommends Whitmer.

A Blackboard initiative can make this process much easier in the future. With embedded analytics, Blackboard is integrating analytics within the workflow of what teachers are already doing, a unique approach in the market.

"Teachers often do not have the time within their busy lives and teaching schedules to go off and think separately about these questions. So, instead of going to a separate reporting area or a menu for analytics, Blackboard is embedding analytics within the workflows the teachers are natively engaging in," explains Whitmer.

In practice, that means that when instructors log into the LMS, they can receive summary updates about how their students are doing and which ones may need attention; when teachers are grading, they get information about student participation; when instructors are reviewing discussion forums, they get information about the quality of student posts, for example: "We bring the analytics to them," says Whitmer.

Do Students Notice Notifications?

The possibility of enabling automatic notifications for students based on their performance and activity is an innovative feature in the Blackboard Learn Ultra Experience. "These alerts are embedded directly within the course, and when they are clicked, a student receives detailed information as well as a suggested action."

According to Whitmer, this feature has been discussed for some time by educators, but institutions have been hesitant in providing notifications directly to students because they are concerned about potential negative repercussions. After all, individuals receive so many alerts and notifications daily that distraction and lack of focus are becoming serious problems.

However, research found that sending rule-based notifications to students is beneficial and recommended. "We have found that students are very interested in receiving these notifications and alerts, and they access them much more frequently than they do other types of e-mails or notifications they get from educational institutions," says Whitmer. "Students want to know how they are doing, and how they are doing relative to their peers, both positive and negative."

In that sense, learning analytics can be intended to identify what is most important and put that in the center of the student learning experience, so they are better able to pay attention and to focus.

"Students can have their own ideas about what they need by going through learning analytics and finding successful or unsuccessful patterns in the past. We are able to identify these behaviors and practices and then bring them to students’ attention," says Whitmer.

What Will Happen Next?

- **More Sophisticated Solutions, Better Insights** – Learning analytics is still at its early stages. As education technologies become more and more integrated, the amount of data available for analytics will increase, as well as new analysis techniques to derive meaning from this data. The solutions for institutions, educators and students tend to become more robust and sophisticated over time.

- **More Critical Customers** – As learning analytics becomes more common, students and faculty will have more experience and become critical consumers of these solutions. They will be able to distinguish, for example, between learning analytics and conventional reporting.

- **More Effectiveness** – Learning analytics will be increasingly used to help instructors, administrators and students make decisions. Also, students will be more successful in achieving their educational goals. This doesn’t mean that analytics will replace human decision-making. "We don’t see a scenario in which analytics is anything close to replacing human judgment," says Whitmer. "In a sense, learning analytics is augmented intelligence."
Ethical Concerns With Learning Analytics: What You Should Be Aware Of

Educational institutions that implement a learning analytics strategy can collect significant student data and create reports based on student activity. But is it ethical to use students' data? Is communicating to students how their data is being used an ethical responsibility of educators? Lastly, are institutions taking proper care of privacy and student rights? Current discussions regarding learning analytics and ethics in the education community have been studying the implications of dealing with such data. This is a complex issue, and there are a variety of concerns that should be considered, especially when innovation in learning analytics continues to be developed at a rapid pace.

Main Ethical Issues Related to Learning Analytics

- **Poor Quality or Insufficient Data** — “Trying to do analytics when you do not have much data, or it is not good quality, is a really difficult and pointless exercise. A lot of work needs to be done in cleaning the data set and compensating for that,” says Sclater. One example of this is something called ‘enmeshed identities’, where students are working together online and the data cannot differentiate between the person who is authenticated and the other members of the group. “In learning analytics, the two
main data sources are generally the learning management system (LMS) and the student information system (SIS), which capture only a tiny bit of the learning that takes place and some of the contextual information. Ideally, we need more data points as well as accurate data."

- **Invalid Analytics** — Not only does the data need to be high quality, the analytics also need to be valid. "One of the main rationales behind predictive learning analytics is that there is a relationship between a student’s engagement in their learning activities and their subsequent success. Generally, the more students engage in the learning process, the more likely they are to complete their course and get a better grade. But engagement is not the same as success, and quite often people confuse the concepts of causation and correlation," Sclater explains.

- **Loss of Autonomy in Decision Making** — This is a frequently discussed ethical issue, particularly with adaptive learning systems which continually change the learning based on how students are performing. "Some people worry that it might ‘spoon-feed’ the students too much with automated suggestions, therefore making the learning process less demanding."

- **Students’ Behavior** — Another issue is related to when students change their behavior, either consciously or unconsciously, if they know that their activities are being continuously monitored. "If the institution is monitoring the e-book the student is reading, is that going to change his or her behavior? That might result in the student improving their learning, but it also might increase stress levels. Some students might even decide not to participate in some activities at all because they feel uneasy."

- **Gaming the System** — Students may do something to try to improve their scores or their engagement. In one institution, for example, Sclater heard about a student inserting their ID card into the library entry system a number of times, trying to improve their library engagement score. "This is an example of unforeseen outcomes that you can have when students are aware that you are measuring things."

- **Obligation to Act** — Finally, Sclater points out another ethical matter he thinks is important: whether there is an obligation on the institution to act on the basis of the analytics. "If you have a lot of data on the students, is there an ethical obligation to do something with it? If it is possible to stop a student from dropping out, should you not be obliged to use that data?,” he asks.

**Adopting learning analytics strategies may come with some ethical and legal concerns. Educational institutions should be prepared to deal with these appropriately.**

**Data Should Be Used Carefully**

Sclater clearly states that students should be aware of the type of data that is being collected about them, and what is being done with it. He mentions that the law in some countries says that if any user asks about what the institution is storing about them, they need to be able to tell the student exactly what it is and what they are doing with it. "I do not think there are many universities and colleges yet that are in a position to do that," he affirms. "The only way forward is to make sure you understand all the data that is being collected about individual students, and be in a position to gather it together and provide it quickly to any student that asks for it,” Sclater suggests.

**Is There an Ideal Way to Carry Out Interventions With Students?**

Learning analytics is only constructive when accompanied by interventions to change student behavior or improve the course. The decision about when to make an intervention varies according to different institutional processes. Sclater believes that institutions should define what he calls "a trigger," meaning what precipitates that intervention. "In some institutions, it might ‘spoon-feed’ the students too much with automated suggestions, therefore making the learning process less demanding."

In other cases, it is when they have not submitted an assignment on time. And, in others, there are regular points in which personal tutors or student advisers will look at where the students are at, four times per semester, for example.”

In addition, institutions should define the different types of intervention, such as an automatic reminder sent to the student, a question, a prompt, an invitation to meet with a tutor, or even a supportive message. “All these measures can be included in an intervention plan,” he says. Institutions should also think about the frequency and timing of interventions for them to be effective.

One of the biggest issues for institutions, however, is about how to get staff to change their working practices, and to understand that analytics is either going to help their daily activities, or make an impact on the students. Lastly, Sclater points out: "There is not much point in carrying out interventions unless you are going to evaluate the success of them."

**In Learning Analytics, Students Are Individuals, Not Numbers**

It is very easy to look at a dashboard or some other kind of analytics and detect a failing student without considering that he or she might have all sorts of potential reasons for that prediction, such as facing an illness or other personal issues, finding the concepts too difficult to understand, or having a demanding job and not having enough time to study properly. "The only way to find that out may be to bring a human into the process," Sclater says.

This means treating students like humans, not numbers. "Many universities are using analytics as a way of identifying the student who might need a subsequent conversation..."
with a person.” Greater data sources can help to find out more about the student and tailor the intervention to their circumstances. “But you are never going to get the whole picture about a student. For many of them, meeting a person to chat through their issues is the only way forward,” Sclater alerts.

Educators Should Focus on the Positive

One of the main concerns for educators is that, if analytics shows students their position among the class percentile, it could potentially demotivate some of them. According to Sclater, while many students want to see that they are doing well compared to their peers, being told or seeing that they are likely to fail could demotivate others. “It is important to tell students early in the course to get into the habit of checking these analytics,” he says. “And then maybe if they are not doing well, the appropriate thing may be for that student to pull out of the course and enroll in a different one. I do not think that the possibility of demotivating a student is a good reason not to show students how they are predicted to perform.”

For Sclater, the best way to provide this information to students is still a matter for investigation. “If we can get the computer systems to understand more about what motivates the individual person, then we may be able to tailor the messages, and the kind of information we present to the students more appropriately.” He is excited by the possibilities that personalization presents. “We are only at the beginning of a journey here. I think the potential is huge for this.”

How to Manage Student Data

The legal requirements concerning students’ data vary from country to country. According to Sclater, some of the matters that institutions should pay attention to are being clear about what data is being collected and why you’re doing that, the capacity to anonymize the data, ensuring that the student has the right to have their data erased if they request that, and developing careful access controls, ensuring that the student has the right to have their data erased if they request that, and developing careful access controls.

Developing a Learning Analytics Policy

Sclater says that educational institutions should develop an institutional policy agreed by the relevant stakeholders in the institution, including students. He suggests some of the main topics the policy should include:

- What kind of data is being collected
- Who is responsible for the overall initiative
- How the institution is dealing with transparency – making it clear what you are doing and what kind of consent you are gathering from students
- What is being done about confidentiality and securing the data
- How to ensure the data and the analytics are valid
- How students will have access to their personal data
- How interventions will be carried out
- How you are going to make sure that there are no, or minimized, adverse impacts on the students

He also recommends the development of a student guide to learning analytics that answers what students might want to know (he has developed a model student guide that can be downloaded here https://analytics.jiscinvolve.org), and of a more in-depth, technical document that presents how the analytics are actually working. Algorithmic transparency, he suggests, is going to be increasingly important.
10 Reasons Why Institutions Should Implement Learning Analytics

Learning analytics turns raw data into valuable strategic information, offering insights to improve teaching, learning, and the environments in which they occur. We’ve gathered 10 reasons why learning analytics has the power to improve the educational experience.

1. PROMOTE REFLECTION AND SELF-REGULATED LEARNING

Student-facing reports help learners increase their performance by providing them with information about their course activity and performance compared to others. Systems like this can provide students with signals about how well they are doing in general, as well as information about specific areas they need to work on. By making learning analytics available to students, institutions can promote self-regulated learning. This practice not only improves student outcomes but also fosters a mindset that may help learners increase their post-graduation success.

2. IDENTIFY STUDENTS AT RISK OF POOR PERFORMANCE

By using data to identify students who are likely to struggle in a course, proactive advising can help students in a timely manner. Learning analytics surfaces relevant information about student engagement and performance that is key for academic advisors and student success specialists. This way, professionals can reach out and intervene at an earlier stage than would otherwise be possible and help learners persist in spite of challenges. For example, using predictive analytics tools like Blackboard Predict, faculty and advisors can start identifying at-risk students before the second week in the semester.

3. UNDERSTAND THE IMPACT OF INSTRUCTIONAL DESIGN PATTERNS ON STUDENT PERFORMANCE

Learning analytics can help identify the most successful instructional design style by program and course. By correlating tool use by faculty and students with specific learning outcomes, institutions can identify and scale high impact practices to assist specific program and curricular goals.

4. INCREASE REPORTING EFFICIENCY

Colleges and universities must fulfill a wide variety of institutional reporting requirements. Many of these concern educational quality and the impact of educational technology investments. By capturing data on learning activity, and automating report creation, learning analytics technology can increase the accuracy and efficiency of institutional reporting in a way that frees analysts to think beyond mere reporting and also use the same data in support of other strategic initiatives on campus. For example, California Baptist University Online used Analytics for Learn to automate an attendance tracking process that was otherwise labor-intensive and prone to error. Because of an increase in institutional efficiency, CBU Online is also able to start using that same information to identify at-risk students and intervene with targeted interventions to keep more students on track for graduation.

5. OPTIMIZE ASSESSMENTS

Learning analytics allows instructors to identify assignments that are highly associated with a student’s final grade and those that tend to correlate with a sudden drop in performance and course withdrawals. Instructors can quickly identify the assessments that are working and those that might need revision.
With access to student engagement information, LMS usage and instructor behavior, instructors are able to create activities that help promote action at high rates. Retrieved November 17, 2017, from https://www.insidhigered.com/digital-learning/article/2017/03/15/pierce-college-use-data-dashboards-improve-graduation-rates


Experiments and Challenges with Learning Analytics Around the World

Since the first learning analytics conference, held in Canada in 2011, the field has been developing rapidly. Some of the trending areas in research are teacher and learner dashboards, predictive analytics and automatic feedback. There is also rising use of natural language processing technologies and multimodal learning analytics. E-Learn interviewed experts from North America, Latin America and Europe in order to understand these trends and to find out how they are experimenting with novel uses of data in education, as well as their perspective on the future of learning analytics.

By: Priscila Ziguunovas

LEARNING ANALYTICS IS AN EMERGING FIELD, AND ITS ADOPTION BY higher education institutions around the world is very uneven. The United States, United Kingdom, Canada and Australia are considered leaders in this domain, while regions such as Latin America are still at an initial stage of exploring its possibilities.

In the United States, there is great awareness and interest in learning analytics by higher education institutions, says Alyssa Wise, associate professor of learning sciences & educational technology and director of New York University’s Learning Analytics Research Network (NYU-LEARN).

“If you talk to leaders at almost any higher education institution in the country, you will see that they know about learning analytics, and they are excited about the idea of using data to help make their students’ educational experiences better, but there is not as much action yet as one might hope,” Wise explains. “I think everybody feels a little behind the curve of what is possible. They think everyone else is doing these spectacular things, but (with a few notable exceptions) most universities are all working through the same set of issues. The reason is that there are a variety of barriers that need to be overcome to put robust learning analytics systems into place,” she adds.

These barriers include technical and infrastructural challenges, and important questions around data stewardship and access to data. “One of the biggest challenges we face with learning analytics projects is that we have a great idea for a project and all of the stakeholders are on board, but nobody knows who is able to give permission to look at the different data sources we need. This has not been something that universities have had to deal with before because nobody has asked,” explains Wise.

In Europe, according to Dragan Gasevic, professor and chair in learning analytics and informatics at The University of Edinburgh, the majority of institutions are aware of learning analytics, and there are some small experiments taking place.

Possible barriers for adoption include shortage of capacity or knowledge to actually understand how analytics can be beneficial for institutions, and the lack of strategic ability, that is, not having institutional leaders that can identify those critical issues and how learning analytics can help. A third barrier would be related to privacy protection and ethics, which is a main issue in specific countries.

“Countries such as Germany have had, historically, through World War II, a huge abuse of their private data, and thus people are much more concerned with respect to ethics and privacy,” explains Gasevic. “What we are seeing, since we are running a major project called SHEILA, is that students are aware of the ethical and privacy protection questions and they have high expectations that institutions will protect their privacy, but at the same time, they also have big expectations that their data will be used.”

In Latin America, a recent study revealed what researchers already knew: adoption of learning analytics in Latin American countries is still at very initial stages, according to Xavier Ochoa, professor and director of the Teaching and Learning Technologies Research Group at the Escuela Superior Politécnica del Litoral (ESPOL), in Guayaquil, Ecuador.

“There are few institutions that are committed to implementing learning analytics in their core processes, but there’s a lot of interest. I haven’t talked with any administrator that is not very willing to try learning analytics at their institution,” says Ochoa. According to him, the lack of researchers and education professionals with expertise in learning analytics is the main barrier for adoption in the region.
Predictive Analytics: An Upward Trend

Alyssa Wise, from New York University, is involved in several different projects that work with proactive support for students through predictive modeling. In predictive analytics, a computational model is created based on students who have previously taken a course, and then applied to students who are beginning the course in order to identify those who are likely to have difficulties.

“The accuracy of the model we have is quite good. We can identify as early as the first day of class who are the students likely to have trouble in a course. The challenging thing is: what do we do about it?” she says.

It is evident through this example that being able to predict difficulties isn’t enough. Researchers and education professionals still need to figure out how to best use this information to support teaching and learning.

In one of the projects, Wise explains, the model shows that student difficulties in introductory college mathematics courses are linked to inadequate prior preparation. “In this particular model the path toward action is actually straightforward. We can offer these students learning resources and mastery driven practice sets to help them get up to speed on the skills and concepts that they may not be strong enough in at the start,” she says.

However, in other cases, the model can predict who will have trouble, but the factors used to predict are not very clearly actionable. “In this case, we know which students are going to have challenges, but we do not know why or how. So, it’s a much more difficult challenge to figure out what to do with the model. Do we show it to the instructors? How do the instructors contact the students and what do they say?” says Wise.

“We have to be careful because you do not want to tell students at the start of a course that you are expecting them to do poorly. This has the potential to be demotivating, and in some cases induce stereotype threat, and thus become a self-fulfilling prophecy,” adds Wise. “Instead, it is important to stay positive and focus on what actions they need to take to be successful.”

According to the expert, NYU has started to build teacher dashboards that give instructors an overview of their students’ digital activities. This can be used both to evaluate particular class elements and identify students that may need particular attention. “The next step is to study how instructors use these new sources of information to inform their teaching and how we can better support them in this process of data-informed pedagogical decision-making,” Wise describes.

This illustrates why a great deal of attention is now being paid to how institutions are putting data and models into practice in ways that are ethical and useful to support teaching and learning.

Feedback Loops: Empowering Students and Teachers

Establishing or improving feedback loops between teachers and learners is the main gain of learning analytics according to Dragan Gasevic, from The University of Edinburgh. That can be especially helpful in larger classes, sometimes with hundreds of students, which makes it impossible for a teacher to interact with all of them at a more personalized level.

“Learning analytics helps us get the insight into the learning patterns of every one of our students, in order to understand, for example, their learning progression, their time management and their misconceptions,” explains Gasevic.

This empowers teachers so they can get much deeper insight into what is happening in their classrooms, especially in blended or flipped models. And more importantly, instructors can also provide personalized individual feedback at scale.

A project in which Gasevic is involved aims to accomplish exactly that. Project OnTask began in 2016 led by The University of Sydney in collaboration with University of Technology Sydney, University of New South Wales, University of South Australia, University of Texas at Arlington, and The University of Edinburgh.

“With learning analytics and support of the OnTask software, instructors are able to provide personalized feedback that scales up highly. For the amount of work to support 3 to 5 students, they are able to personalize feedback for hundreds or thousands of students”, Gasevic explains. The project’s results show increase in student performance, satisfaction, and learning process.

The connection between learning analytics and learning design is another important topic in the field. Learning analytics can help teachers to reflect on the effectiveness of their learning design.

“For example, when I am teaching a course, I can reflect on what is working in my course, or what is not working, and based on that I can make certain changes in my design and, in little time, start making that orchestration much more effectively,” explains Gasevic.

Gasevic and his team developed an award-winning software called LOCO-Analyst, a tool that aims at providing teachers with feedback on the relevant aspects of the learning process taking place in a web-based learning environment.

“When we developed LOCO-Analyst we were trying to analyze different types of digital traces generated by learners as they were using and interacting with digital resources on the web and inside of their learning environments, such as Blackboard Learn,” he explains.
According to the expert, one of the functionalities that is most appreciated by teachers offers critical insight not only at the level of particular resources, but at the conceptual level, and the way students are actually constructing knowledge around certain concepts. The insights into different acts of social interaction that happen among students are also valued. Gasevic sees a fairly big disconnect in terms of what is actually needed by teachers and students, and what is currently out there. “What is happening in reality is that most teachers and students do not understand the content in their dashboards. I attribute that to major problems, and the first problem is related to the lack of proper ethnographic studies trying to understand the teachers and the students in the way they can embed and use analytics inside of their specific tasks,” says Gasevic.

**Beyond the LMS: Multimodal Learning Analytics**

At the beginning, learning analytics worked exclusively with data from online tools, like learning management systems or online games. But what about the learning that is happening outside the computer? How could data from the real world, such as in classrooms, student groups, or even when students are doing their homework, be captured and measured? This branch is called multimodal learning analytics and it’s Xavier Ochoa’s personal field of research.

“Multimodal learning analytics arise naturally out of the need to understand learning where it is happening. For example, there is a lot of learning that happens when students work together, trying to solve a problem or an exercise in a course. If there is no computer there, there aren’t traces of these activities. Maybe you have the end results of what they did, but a great deal of information is lost if you only analyze the end result,” he explains.

Multimodal learning analytics exploit audio and video recordings, what students write, look at, and say, and all this information is used to get a clear picture of the learning process.

“Humans are multimodal in nature, we capture information through all our senses, so we are trying to make the computer do something similar,” explains Ochoa.

According to him, as technology became more accessible over the recent years, the development of multimodality became a reality. Two factors that have enabled the field of multimodal learning analytics are the development of artificial intelligence and the availability of very cheap sensors.

“Imagine that you can have a device that costs almost nothing with a camera and a microphone,” describes Ochoa. “With this type of sensors and the right software, it’s possible to analyze, for example, student posture, create transcripts of what the student is saying, or capture emotions in the student’s voice. So, now, computers are able to see, are able to hear, and we are trying to exploit those capabilities to better understand the learning process.”

This expert estimates that 30% of studies on learning analytics currently include some kind of multimodality. That could be an indication of institutions realizing that they need to be more holistic when looking at learning processes.

One example of a multimodal analytics project developed by ESPOL is a tutor environment where students can practice giving presentations. Students enter a room, close the door, and then they are greeted by a virtual audience to whom they can present their slides.

“The system will analyze their posture, their gaze, the volume of their voice, if they are stammering, and it will analyze their slides, if they have too much text or the font is too small, and will give an automatic feedback on the presentation,” describes Ochoa.

On that same area, ESPOL is using multimodal learning analytics to understand what differentiates experts from non-experts while they are trying to solve a problem. That’s a type of system where multimodal learning analytics is used to provide feedback not for the student, but for the instructor.

“We can try to understand if a student has reached mastery in a skill just by looking at him or her. That’s exactly what a professor would do, observe student behavior,” compares Ochoa.

**What’s Trending?**

- Technical and theoretical advances are making it possible to collect better and richer data.
- This can be done not only through online tools, but also through clickers, sensors and motion detectors that collect data from the real world. That’s multimodal learning analytics.
- Providing automatic, personalized feedback through student behavior analysis is becoming more common, especially for large classes.
- Natural language processing technologies are being used to analyze student-created products. This allows instructors to go beyond multiple-choice questions and respond to students’ creative works as well.
- Researchers also want to discover how analytics can help understand students’ emotions, not just their cognitive state.
- A challenge that researchers currently face is that tools have to be designed to work in specific learning contexts, but at the same time they need to be general enough to be used across different courses and even institutions.
- Learning analytics will be increasingly used to support decision making for students, instructors, administrators, institutions and even governments.

**Sources**

Identifying at-risk students and helping them out. That’s what the use of Blackboard intelligence and learning analytics solutions has brought to Concordia University Wisconsin (CUW).

**By: Leonardo Tissot**
Mequon, Wisconsin, United States

**Before the use of this technology, if students were struggling with learning, the university had to rely on faculty reports. And several times, when it came to this point, it was already too late for students to get back on track and save their semesters. “Now, we are able to make an early intervention,” says Elizabeth Polzin, Assistant Vice President of Academics for Student Success at CUW.**

The work started about a year ago, first limited to on-campus undergraduate students. That was a precaution measure – making sure they were getting reliable data. And the results have been great so far. Last fall, CUW had a retention rate of 72%. A year later, the university experienced a 10% increase, reaching a record 82% retention rate. Along with the involvement of administration and faculty, analytics also was a big part of this result, Elizabeth believes. “The data we collected this past year helped us better understand the challenges our students were encountering and aided us in much earlier intervention,” she says.

**In Search of a More Personalized Experience**

At CUW, students are not just “a number.” “We are proud to say we know students’ names at CUW. The ability to use analytics to better serve our students provides them with a personalized experience. Rather than waiting until the end of the semester to determine what went wrong, we have to be able to take note when they stop attending class or begin to fall behind in their coursework,” Elizabeth points out.

The most important endeavor is to find out how students are developing in their academic commitments while there are still opportunities for recovery if they are doing poorly, not just at the end of the semester when it is too late. That is what academic support is there for.
“With the Blackboard learning analytics tools, this year has been a bit of an explosion for us. We just started to dabble with what types of reports we could create, and better strategize our outreach. I think it’s one of the reasons we saw a big jump on our retention rate: we had the opportunity to provide personalized outreach before the semester was over,” the assistant VP says.

The use of data analysis has improved relationships between faculty and students due to a new referral system for professors. In the past, when a student started to struggle, faculty may have felt as though they had to deal with the situation on their own. However, that’s not something all professors feel comfortable with. Now, there is a system in place where faculty can refer students they are concerned about, and an academic support team is able to use analytics to address students’ needs.

More than offering students and faculty the best possible experience, learning analytics has also been impacting CUW’s revenue through academic support. “It’s a better use of time and human resources in general. As a supervisor, I prefer to not have my team spinning their wheels in a direction where they end up in a dead end. Using analytics gives us focus and direction as to the best way to serve our students,” Elizabeth reflects. “The bottom line is: through the use of analytics, we know that our decisions are informed, and the results we’ve seen are a positive consequence of that,” she concludes.

The dashboards help the university envision how to support students more efficiently – even the ones who need outreach at the beginning of the semester, before they even start struggling with their education. “With a review of identified risk factors at the beginning of the term, our intervention can start much earlier than it has in the past,” Elizabeth says.

CUW also has an intervention team to help students, such as getting to know what types of problems they are experiencing and trying to formulate solutions – from financial to mental health. If a student disappears for a while, it’s possible – through the attendance feature – to determine if they haven’t been to class. With that type of real time information, a university staff member can follow up with the student to determine what support they may need. Instead of using automated emails, we’re able to provide individualized outreach from someone the student knows.”

Offering Better Quality Outreach

Based on the data provided, CUW is working with dashboards that can be viewed by each of their advisors, with focus on student performance and a variety of risk factors. For example, “advisors can now easily view whether a student has had a significant drop on their GPA from the prior term, if they are registered for 18 or more hours but have a low GPA, or if they have had a significant drop in term GPA from their cumulative GPA” among other data.

Over the past four years, we’ve focused on collaboration with the teaching and learning community by sharing:
“The only way forward is to make sure you understand all the data that is being collected about individual students, and be in a position to gather it together and provide it quickly to any student that asks for it.”

Elizabeth Polzin
Assistant Vice President of Academics for Student Success at Concordia University Wisconsin

“Analytics is not a replacement for human judgment. It’s a form of information, but it still needs to be interpreted, and that interpretation requires human wisdom.”

Niall Sclater
Consultant and Director at Sclater Digital

“At Concordia University Wisconsin, students are not just a number. We are proud to say we know students’ names.”

Timothy Harfield
Senior Product Marketing Manager for Blackboard Analytics

Elizabeth Polzin
Assistant Vice President of Academics for Student Success at Concordia University Wisconsin