WELCOME FROM THE STREAM EDITOR: LEARNING ANALYTICS IN ONLINE EDUCATION

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Abstract

Analytics is the discovery and communication of meaningful patterns in data. Businesses have used analytics for years to improve their products and customer satisfaction. Now it is time for education to use analytics to improve teaching and learning. Analytics can also be used to improve the effectiveness and efficiency of delivery of educational content. In this editorial, we address some key areas of educational analytics.

KEY WORDS: analytics, privacy, institutions, students, teachers

I am pleased to welcome you to the Stream on Analytics in our new journal, *International Journal on Innovations in Online Education*. In this inaugural issue, we explore the role of learning analytics in educational innovation. Analytics is the discovery and communication of meaningful patterns in data. As more and more technology is integrated into today's instruction from K–12 to higher education to continuing education, there is an unprecedented opportunity to use analytics to make learning more effective and efficient. This introductory paper explores the current state of the art in analytics-driven education and its potential as a revolutionary force to change the way we teach and learn. We will discuss several case studies on how analytics are used in multiple disciplines and will highlight some of their impact on K–12 and higher education. In future issues, we will discuss learning analytics standards, institutional use of learning analytics to reduce dropout rates, controlling cost of education with the help of analytics, and improving student learning using analytics.

Learning analytics can help revise curriculum, provide better teaching, and improve assessment in real time. More and more learning management systems will provide dashboards that can be used to get a snapshot of the state of a course. Systems like Purdue University–based Course Signals will alert instructors when a student is falling behind. The intelligent tutoring system-based platforms like Open Learning Initiative (OLI) will continue to guide the learners through a path based on what the system thinks is the next best thing to do to for the learner. Innovations in analytics in education will come from individual instructors who can now utilize modern tools (such as Classroom Salon, Edmodo, or Knewton) to design, deliver, and use the data

to improve instructions. Sometimes, the interpretation of data at the macro level can be difficult. Therefore, third-party predictive analytics companies will provide services to educational institutions that are trying to interpret large collections of data. For example, in one recent study at American Sentinel University, the data predicted that if a student completes half the curriculum, they are 99% more likely to complete the degree. This is valuable data to the institution to minimize student dropouts by providing more support during their first half of study. There is no magic bullet in educational analytics. Creating a better learning environment and obtaining good outcomes is a complex task. When a student fails a course or doesn't submit an assignment or attend class, the reasons can be much more complex than just the educational data analytics. But educational analytics provide a way to "know" the status of the student without any formal assessments. Sometimes it is better to know than to measure. Formative assessments like tests and quizzes do not always tell the whole story. Instead student data must be available on a daily basis and in easy-to-understand visual formats so instructors can make real-time adjustments to their teaching techniques to maximize the course outcomes.

In flipped classes, the role of analytics becomes even more important. If the instructor knows which sections students are having trouble with, those concepts can be addressed in class more effectively. One key question that still must be addressed is the privacy of data. How can we balance privacy while using data to make good teaching decisions and help students navigate through courses? One other thing is clear. With the availability of platforms like Google, Wikipedia, and YouTube, we no longer understand how or when students really learn. Therefore, future educational systems must find ways to integrate with other data sources, such as Google, Wikipedia, and YouTube, to create a more global picture of the learner. All in all, we think that analytics-driven learning will dominate education in the coming years. It will allow faculty resources to be efficiently allocated to teaching and learning. Analytics can only create better outcomes in education, and we remain hopeful that analytics will significantly drive educational outcomes and reduce the cost of education.

In the future issues, we will address learning analytics standards, institutional use of analytics to reduce cost and reduce dropout rates, privacy issues when collecting vast amounts of data, and use of computational techniques such as machine learning to help interpret data and to discuss how individual instructors are utilizing learning analytics to help improve their teaching. We encourage educators to innovate on how they use analytics in their teaching. As you invent new ways to teach using analytics, submit a paper to me to be considered for a future issue.

MEET THE STREAM EDITOR

Ananda Gunawardena is a teaching faculty member in the Department of Computer Science at Princeton University. He served as an Associate Teaching Professor of Computer Science at Carnegie Mellon University (CMU) from 1998 to 2013 and is currently a adjunct faculty member at CMU. He is a longtime advocate of technology in education and the application of the principles of learning sciences to teaching and learning. He is the co-author of two college textbooks in computational linear algebra published by Springer-Verlag and Thompson Brooks-Cole and is the author and co-author of over 35 research articles. His textbooks have been translated into other languages. He is the co-creator of Classroom Salon, a platform to increase student engagement through annotations and analytics. He has received funding from NSF, Qatar Foundation, Hewlett Packard, Microsoft, Google, and many other foundations. His many honors include leadership in technology award from HP, service award from Jesse Jones Institute, ACM Appreciation Award from ACM Houston chapter, and Exceptional Achievement Award (highest honor given to Sri Lankan expatriate) from the Sri Lanka Foundation. He was a founding fellow of HP Catalyst Institute in 2010. From 2010 to 2013, he co-led the HP's measuring learning consortium, a multimillion-dollar effort to introduce data-driven learning. He is currently the Stream Editor for learning analytics at the *International Journal on Innovations in Online Education*. He typically teaches courses in algorithms, data structures, systems programming, and pen and mobile computing. His research interests include technology in education, learning sciences, and HCI.