

## **Book Review: Big Data and Learning Analytics in Higher Education: Current Theory and Practice** edited by Ben Kei Daniel (2016)

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**B**ig data and learning analytics are increasingly common buzzwords in higher education circles, but what do those phrases mean, and what are their implications for practice in higher education? *Big Data and Learning Analytics in Higher Education: Current Theory and Practice* begins to answer these questions. Editor Ben Kei Daniel defines big data as “the significant growth in volume and variety of data that is no longer possible to manage using traditional databases” (p. 1). For example, learning management systems such as Blackboard and Moodle have become increasingly commonplace over the last decade, and they have enabled the generation and collection of huge amounts of data on student behavior and academic performance. “Learning analytics” in this context refers to methods and tools used to gain insight from big data to accelerate student growth (p. 127). The purpose of this book is to provide an introduction to some of the current debates in the field of big data and learning analytics, as well as some examples of how these concepts are being implemented in higher education.

*Big Data and Learning Analytics in Higher Education* is comprised of fifteen chapters split into two parts. The first part (chapters 2-6) examines conceptual issues and several examples of using big data in a higher education context, and the second (chapters 7-15) primarily focuses on the implementation of learning analytics. In the section on big data, several chapters address big data from a conceptual point of view—they provide an in-depth explanation of what big data is and situate big data in the broader landscape of higher education. Other chapters examine the role of big data in academia, including the effects of big data on social scientists' training and how big data affects the slow, deliberative process of academic research and thought. Another chapter investigates embedded digital ecosystems (systems that hold data from many different sources) that use big data to explore the relationships between data sources.

The second section of the book discusses how learning analytics programs can use big data to gain insight into students' behavior and academic progress, and how that insight can be translated into meaningful interventions for students. Two chapters discuss the ethics of big data and learning analytics, while another chapter specifically addresses the need to develop frameworks to determine how and when learning analytics prompt interventions. Several chapters discuss the synthesis of data from multiple sources, such as creating open learning analytics

systems and merging data from a learning management system with data from students' social networks to better understand students' complete learning environments. Another explores a partnership between a four-year institution and two local community colleges to synthesize their data to create and apply predictive models to new transfer students. Other chapters discuss novel, early-stage digital learning tools that use big data and learning analytics to gain insight into students' progress, such as utilizing interactive, conversation-based learning scenarios that generate lots of data for instructors to use.

### **Impact for Academic Libraries and Instruction Librarians**

As is repeated many times throughout the book, data-driven decision making is quickly becoming the gold standard in higher education. Big data techniques enable data collection and analysis on a larger scale than ever before, giving leaders more information with which to make decisions. The wide range of possibilities opened by big data leads Daniel to note, “Big Data has been proposed as the dominant paradigm to examine and address challenges in higher education” (p. 20). Though not explicitly mentioned in this book, academic libraries are not exempt from the shift towards big data and data-driven decision making and instruction librarians can use learning analytics to enhance their interactions with students.

Academic libraries have their own methods for collecting data, including circulation and online resource usage statistics, gate counts, records of library instruction and reference interactions, special events, and more. Often, these data are collected and stored in library-specific systems, but the trend towards campus-wide data-driven decision making may lead to the integration of library systems, if they are not already, with other campus-wide data collection systems. For example, Chapter 12 discusses the potential for open learning analytics ecosystems that combine data from disparate systems to get a broader view of the entire student experience, from academic performance to housing to financial aid to extracurricular activities. One could readily see library data become an indicator in this type of analytics ecosystem, because a correlation has been demonstrated between student library use and academic success and retention (Soria, Fransen, & Nackerud, 2014; 2017).

However, as noted in Chapter 7, there are significant privacy concerns associated with big data, and the processes necessary to protect privacy and use data ethically have not yet been fully developed. For example, the amount and type of FERPA-protected data that can be shared with outside providers of learning analytics software without students' consent has not been definitively set. Libraries have an established set of ethics and practices around the privacy of patron data, so conflicts may arise between the institutional desires for data integration and library and librarian privacy standards. Since it is likely that in one form or another, big data and learning analytics will become part of an instruction librarian's job—whether they are conducting an assessment, working with students who have been flagged by learning analytics, or adding data to the system themselves—librarians should be proactive in working with their directors and provosts (if they haven't already) to establish library-wide policies for what data is collected and how it should (and should not) be shared.

Big data and learning analytics also offer instruction librarians opportunities to advance their own teaching and research. Many librarians are developing digital tools to enhance their instruction, whether as part of their face-to-face classes or for classes taught primarily or exclusively over the internet. Particularly for the latter, learning analytics offer librarians a way to better understand how e-learning students are using those tools and to track e-learning students' engagement with library instruction and resources. For example, Chapter 14 examines how data from an interactive assessment was used to understand student progress; in a game-like scenario, students worked through a sample experiment designed to test their understanding of the scientific method. Instructors could track exactly where students struggled, and provide additional help as needed. Such an assessment could be used to refine the teaching of information literacy skills, in order to better connect students with resources specific to their needs. Learning analytics could also be used to track students' use of library resources, and students who are not using those resources could be directed to do so. Additionally, librarians could use big data and learning analytics strategies in their research to understand how students' interactions with the library relate to and impact other aspects of their lives.

One problem with the implementation of big data and learning analytics strategies is presented in Chapter 4 and applies to many librarians: the lack of training in graduate education in the use of big data and learning analytics. Some librarians may have a natural inclination to learn these skills and seek them out on their own, but big data is not yet included in most LIS curricula. This issue dovetails with many critiques of how LIS degrees prepare

graduates to be academic librarians, and highlights the additional work necessary before the use of big data and learning analytics can become truly integrated into the everyday practice of instruction librarians.

## Recommendation

*Big Data and Learning Analytics in Higher Education: Current Theory and Practice* provides a good introduction to what big data and learning analytics are as well as some current and potential applications in higher education. It is not a guide to implementing big data and learning analytics strategies in higher education; because this is a rapidly evolving field, this book is primarily a speculative exploration of the possibilities and challenges around such implementation. Its language is at times too technical for someone without prior data analysis or computer programming knowledge to fully comprehend, but the majority of the book is understandable to someone without much previous experience with the topic. I would recommend this book to librarians who are seriously interested in understanding the potential implications of big data and learning analytics in their institutions and/or in using big data and learning analytics in their own research and instruction, but this book will probably be overkill for the casual reader looking for an overview of big data.

## References

- Soria, K. M., Fransen, J. L., & Nackerud, S. (2014). Stacks, serials, search engines and student success: First-year undergraduate students' library use, academic achievement, and retention. *The Journal of Academic Librarianship*, 40(1), 84-91.
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