Information and Learning Science
The problems and promise of learning analytics for increasing and demonstrating library value and impact
Megan Oakleaf,

Article information:
To cite this document: Megan Oakleaf, (2018) "The problems and promise of learning analytics for increasing and demonstrating library value and impact", Information and Learning Science, Vol. 119 Issue: 1/2, pp.16-24, https://doi.org/10.1108/ILS-08-2017-0080
Permanent link to this document: https://doi.org/10.1108/ILS-08-2017-0080

Downloaded on: 22 October 2018, At: 21:34 (PT)
References: this document contains references to 22 other documents.
To copy this document: permissions@emeraldinsight.com
The fulltext of this document has been downloaded 335 times since 2018*
Access to this document was granted through an Emerald subscription provided by emerald-srm:434496 []

For Authors
If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com
Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.
Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.
The problems and promise of learning analytics for increasing and demonstrating library value and impact

Megan Oakleaf
iSchool, Syracuse University, Syracuse, New York, USA

Abstract

Purpose – The purpose of this paper is to describe the need for academic libraries to demonstrate and increase their impact of student learning and success. It highlights the data problems present in existing library value correlation research and suggests a pathway to surmounting existing data obstacles. The paper advocates the integration of libraries into institutional learning analytics systems to gain access to more granular student learning and success data. It also suggests using library-infused learning analytics data to discover and act upon new linkages that may reveal library value in an institutional context.

Design/methodology/approach – The paper describes a pattern pervasive in existing academic library value correlation research and identifies major data obstacles to future research in this vein. The paper advocates learning analytics as one route to access more usable and revealing data. It also acknowledges several challenges to the suggested approach.

Findings – This paper describes learning analytics as it may apply to and support correlation research on academic library value. While this paper advocates exploring the integration of library data and institutional data via learning analytics initiatives, it also describes four challenges to this approach including librarian concerns related to the use of individual level data, the tension between claims of correlation and causation in library value research, the need to develop interoperability standards for library data and organizational readiness and learning analytics maturity issues.

Originality/value – This paper outlines a path forward for academic library value research that may otherwise be stymied by existing data difficulties.

Keywords student learning, library value, academic libraries, student success, learning analytics, interoperability standards, library impact

Paper type Viewpoint

Throughout higher education, calls for accountability and the demonstration of effectiveness are ubiquitous. Higher education institutions are expected to develop students who achieve learning outcomes, complete programs and degrees, graduate in a timely manner and enter their communities ready to secure appropriate employment and become productive citizens. Higher education stakeholders – including students, parents, faculty, staff, administrators, leaders, governing bodies and community members – demand that institutions achieve these goals and, at the same time, show evidence of their achievement.

Library impact on student learning and success

As pillars of higher education institutions, academic libraries must also contribute to the development of student learning and success and provide evidence of that contribution. Indeed, most librarians acknowledge that their impact on student learning and success is the key to demonstrating library value within their institutions. As a result, over the past
several years, many librarians have embraced the use of assessment and research to explore links between student library interactions and student learning and success measures. The University of Huddersfield, in collaboration with the Jisc Library Impact Data Project, and the University of Wollongong (in the UK and Australia, respectively) are early pioneers in this effort (Jantti and Heath, 2016; Jantti and Cox, 2013; Stone and Ramsden, 2013). Since the 2010 publication of ACRL’s Value of Academic Libraries report, academic libraries across the USA have also attempted to link student library interactions with student learning and success (Association of College and Research Libraries, 2010). At the University of Minnesota, librarians have linked student library usage with grade attainment, retention and graduation (Soria et al., 2013, 2014, 2017). In their footsteps, and in part though the Assessment in Action program offered by ACRL and funded by Institute of Museum and Library Services (IMLS), dozens of libraries have followed suit in an effort to establish similar linkages between student use of library services and resources and indicators of learning and success (Brown et al., 2015, 2016; Ackermann, 2015).

In general, the research linking libraries with student learning and success has embraced a correlation approach. Essentially, librarians have used correlation methodologies to connect library contributions in the form of services and resources with the needs, goals and outcomes of their institutions (Figure 1). In an effort to investigate the linkages between libraries and institutional goals, typical correlation research questions follow a three-step formula (Figure 2) (Oakleaf et al., 2017). Essentially, librarians pair (1) library service or resource engagement or use data with (2) data that serves as a surrogate for student learning or success; then they connect these two elements with (3) a verb expressing a potential relationship. Example research questions that follow this format are found in Figure 3 (Oakleaf and Kyrillidou, 2016).

In recent years, this nascent research stream has successfully produced results that connect student engagement with library services and resources with student learning and success markers including grade attainment, completion of courses, persistence through programs and timely graduation (Soria et al., 2017; Murray et al., 2016; Catalano and
Phillips, 2016; Soria et al., 2013, 2014; Stone and Ramsden, 2013; Jantti and Cox, 2013). At the same time, a pattern of difficulties with this type of research – difficulties stemming primarily from the data available to conduct this research – has also emerged.

The data problem

When librarians investigate the impact of library services and resources on student learning and success, they require both library data and institutional data to conduct their research. For example, they need to capture library data, such as student use of reference or instruction services, circulation data, digital downloads or library space usage. They also need data that serves as a surrogate for student learning and success, such as student course grades, retention rates, graduation numbers or initial workplace earnings. Unfortunately, both pools of data can be problematic in three main ways, namely, data can be too imprecise, completely unavailable or inaccessible due to institutional silos (Oakleaf et al., 2017). Sometimes, available data are too imprecise and finer levels of granularity are needed (Oakleaf et al., 2017). A typical example of an imprecise data point is the use of grade point average (GPA) data as a surrogate for learning outcomes. Most educators will acknowledge that course grades are an imperfect stand-in for learning outcomes data; grades are influenced by attendance, participation, writing and speaking ability, etc. Thus, many factors that are not related to mastering course content influence course grades, rendering them potentially false equivalents of learning outcomes data.

Other times, too little data are available. Data may be unavailable because the necessary data has not been recorded or maintained by either libraries or their institutions, or it may be that the data required for research is inaccessible as a result of “silos”. That is, the data may be owned by the institution (and not shared with the library), buried in vendor-owned data systems or stored in formats that are not easily translatable, preventing the research from being conducted at all. In fact, siloed data are an obstacle that presents a major challenge to taking the current body of research correlating libraries with student learning and success to the logical next step (Oakleaf et al., 2017).
The next step for library value research

To advance correlation investigations of academic library contributions to student learning and success outcomes, academic librarians should consider expanding the data used in their research efforts. Librarians with access to data that is granular, accessible, translatable across library and institutional systems and focused on student library interactions, student learning outcomes and student success indicators would be capable of designing future library impact investigations that reveal far more information about the impact of libraries on student learning and success. Such data-enabled research could support students in new, innovative and transformative ways. However, to gain access to such data, librarians must either obtain permission to access current data silos or acquire the ability to translate data from these silos, including library vendor systems, learning management systems, student engagement information systems, learner relationship management systems, student advising systems, co-curricular/extracurricular involvement systems and any existing institutional data warehouses. In short, to move to the next logical step of library correlation research, librarians must prepare to engage and exploit the “learning analytics” efforts that are proliferating throughout higher education institutions (Oakleaf et al., 2017).

Learning analytics

In higher education venues, learning analytics has been explained in a number of ways, but perhaps the clearest definition is this:

[...]

Essentially, learning analytics use data to improve learning contexts and help learners succeed.

To improve instructional environments and support learners, learning analytics systems input data from a variety of sources and output descriptive information about student populations and cohorts which is then used to discover behaviors, characteristics or other attributes that appear to lead to student difficulties or successes. Many learning analytics systems attempt to predict, based on known attributes, which students are “at risk” so that educators can intervene quickly. Interventions emanating from learning analytics systems include notifications to students, advisors or faculty; requirements for students to meet with support services, changes to institutional processes or policies; or other actions intended to support improved student outcomes (Alhadad et al., 2015).

Within the larger sphere of learning analytics, there are several levels. The most basic level of learning analytics describes what is happening in the learning environment and what learners are doing. This level is aptly named “descriptive”. The next level, termed “diagnostic”, refers to learning analytics that determine what is facilitating or hindering student success; the goal of this level of learning analytics is to diagnose obstacles and facilitators of student success. The third level, “predictive”, refers to the use of data to predict likely student success or failure. This predictive level is the focus of current development in higher education learning analytics and has been defined as:

[...] the ability to accurately predict future outcomes using learning data...[which] empowers stakeholders in the learning process (e.g., students, faculty, administrators, et al.) with intelligence on which they can act as means to achieve more desirable final outcomes (Alhadad et al., 2015).
The most advanced level – the “prescriptive” level of learning analytics – is not yet a reality, but it is conceptualized as the use of predictive analytics to suggest specific interventions and actions known to aid learners (Phillips, 2015).

Learning analytics systems come in a variety of forms and draw from a wide range of data sources. Many are “home grown” by individual higher education institutions, and even more are offered by vendors either as single offerings or suites of learning analytics “solutions”. The learning analytics landscape is growing and fast changing; it is difficult to obtain a census of all the options. In general, learning analytics tools tend to be clustered into or across the following system categories: enrollment management, relationship management, business intelligence/reporting, learning management system activity/achievement monitoring, integrated planning and advising, early-alert warning and degree mapping. Typically, the data used by learning analytics systems come from student information systems, learning management systems, clickers, publishers, video-streaming and web-conference tools, surveys and co-curricular and extracurricular involvement systems (Alhadad et al., 2015). At this time, library data are generally not included in learning analytics systems, but the next generation of library value research may well depend on academic library data integration into these institutional systems.

Challenges

Moving from existing library correlation research, or “library analytics”, to institutional learning analytics represents a potential sea change in the demonstration of library value. With that change come a number of challenges. First, the integration of library data into institutional learning analytics requires librarians to reconsider long-held practices related to the use of individual level data. Second, participation in learning analytics does not surmount the correlation versus causation challenge of demonstrating impact. Third, the inclusion of library data in institutional data systems may require the development of library-specific interoperability standards. And finally, adoption of a learning analytics approach will not help librarians use library value data to improve their libraries and their impact on student learning and success unless they have organizational structures in support of evidence-based and data-driven decision-making and action-taking.

Individual level data

Academic librarians have historically eschewed the collection and use of the individual student level data that is integral to institutional learning analytics approaches. Participating in institutional learning analytics would require librarians to change course and begin gathering and maintaining individual level data. While librarians could pursue a path of in-house data analysis – requesting institutional level data from their campus partner and pairing that data with library data to conduct their research independently – that path is onerous. As a result, librarians that seek to embrace learning analytics will likely determine that the expeditious route is to share their data with institutional sources, perhaps becoming fully integrated with institutional data warehouses or record stores. This too is a significant shift for librarians who have historically guarded any individual level data as a closely held value and professional ethic. Thus, the inclusion of library data in institutional learning analytics systems requires a significant shift in professional library practice and a reconciliation between long held ethical positions and new imperatives to support student learning and success.
**Correlation versus causation**

Librarians engaged in the demonstration of library value by correlating student library interactions with learning and success indicators acknowledge that their results are just that: correlations, not causal relationships, between the two. That is, research has shown that students who engage more with library resources tend to earn better grades, stay retained, graduate, etc. However, existing research does not definitively demonstrate that student library interactions cause students to learn more or attain success markers (Oakleaf and Kyrillidou, 2016). Descriptive learning analytics initiatives are also built on correlations, and causation remains elusive. The problem can be explained as follows:

Many scholars believe, particularly in social science research fields, not only that correlation does not imply causation, but also that demonstration of causation is impossible, because there are too many unknown and uncontrollable factors. The problem of unknown and uncontrollable factors is especially significant in educational settings, where students are potentially influenced by endless prior and concurrent experiences that impact research results, and randomized control studies, usually considered the gold standard of experiment research, are not typically feasible. Other scholars acknowledge that while definitive causation cannot be proven, that given consistently strong correlations, a theoretical model that supports a causative connection, and research that controls for all other factors and alternative explanations, it may be reasonable to argue that a causative relationship exists and to act on that assumption. If a librarian subscribes to the first idea (that causation is not demonstrable), then strong, positive correlations are a suitable end goal for research and the results of such research can be communicated and employed to make decisions and take actions. If a librarian is persuaded by the second position (that correlations bolstered by proven theory and shown to be free of all other influencing factors are equivalent to causation), then strong, positive correlations must be contextualized within a larger theory and additional factors and explanations must be ruled out before the results of such research can be declared causative and then shared and used to make decisions and take actions. (Note: In the second scenario, librarians should also be prepared to explain their claims of causality to those who subscribe to the first idea of causation.) Arguments about causation aside, strong, positive correlations are the stuff of action for librarians. When librarians determine that particular library activities or interaction are correlated with positive learning or other outcomes, those correlations point the way for librarians to plan improvements to library services and resources. If students who exhibit a particular library interaction behavior or set of behaviors are more likely to demonstrate learning gains or other positive outcomes, then it seems reasonable for librarians 1) to instruct and encourage students to adopt these behaviors, 2) to ensure that the library services, resources, and systems students encounter as they engage in these library interaction behaviors are streamlined, effective, efficient, and rewarding, 3) to communicate the success of students who engage in these behaviors to stakeholders including but not limited to faculty, administrators, parents, and the students themselves, and 4) to engage additional research to learn more about the interconnectedness between these behaviors and positive student outcomes (Oakleaf, 2015).

Thus, the fact that descriptive learning analytics is a correlation-based approach is not a disqualifier for librarians striving to demonstrate library value, but neither is it a panacea for those who seek out only causal connections between student library interactions and student learning and success.

**Interoperability standards**

To prepare to engage in institutional learning analytics initiatives, libraries may need to develop and adopt library-specific interoperability standards that will enable “the collection, storage, and transport of data about learning” across institutional and library data systems (Oakleaf et al., 2017). A growing number of learning technologies have adopted common...
data models, such as the one proposed by Unizin (Scott, 2017), or interoperability standards, like Caliper, a standard that:

[... ] provides data structure and semantic interoperability, resulting in an improved exchange of information across applications and institutions [... ] which could change the experience for students, faculty, and [other higher education professionals] by enabling more-sophisticated analytics, learning dashboards, and advising tools (Whyte et al., 2016).

Indeed, an IMLS-funded grant project entitled Libraries Integration in Institutional Learning Analytics (LIILA) commences in July 2017 to:

1. increase librarian awareness of and engagement in learning analytics;
2. craft a plan for integrating academic libraries into learning analytics initiatives that support student learning and success;
3. develop sustaining learning analytics partnerships and collaborations among academic librarians, educational technology lynchpins, institutional and library IT professionals, and library vendor communities; and
4. explore, design and develop library use cases and data profiles based on learning analytics practices and interoperability standards that can be used to integrate library data with institutional data stores.

In time, common data models and interoperability standards may diminish the current challenges associated with transferring data across library and institutional systems.

**Decision-making and action-taking readiness**

A final challenge of realizing the promise of the inclusion of library data in learning analytics systems is one of organizational preparedness. Adoption of a learning analytics approach will not help librarians improve their libraries and increase their impact on student learning and success unless they have organizational structures in place to support evidence-based and data-driven decision-making and action-taking. Like their overarching higher education institutions, libraries often strive to be data-driven, but often day-to-day decisions may not be as evidence-based as librarians intend. To be successful, libraries seeking to integrate their data with learning analytics efforts would do well to develop a culture that prioritizes data-driven decision-making and possesses the appropriate policies, procedures and skills to underpin data-centric action-taking (Alhadad et al., 2015).

**Conclusion**

While librarians have made great strides in the effort to link the value of academic libraries to institutional missions related to student learning and success, there is more work to be done. Learning analytics offers one pathway for the continuance and development of research into the impact of libraries on student attainment of learning outcomes, completion programs and degrees, timely graduation and workplace and lifelong success. A few libraries are in the early stages of investigating the inclusion of library data into institutional learning analytics initiatives, including the University of Minnesota, DePaul University, TX Tech University and Nevada State College. Librarians seeking to learn more about this approach can begin by reading about learning analytics and asking questions about learning analytics efforts at their institution (Oakleaf, 2016). Primed with an understanding of the promise and potential pitfalls of library integration into institutional learning analytics, librarians can maximize their capacity to demonstrate and increase the impact of the library on student learning and success.
References


Corresponding author
Megan Oakleaf can be contacted at: moakeleaf@syr.edu