Literature Review

Topic: Analytics in Higher Education/ Next Generation LMS


In this article, author Chaurasia (2017), Big Data analytics in education is of significant interest and has gained high priority for most higher education institutions. Consequently, both practitioners and academics see great opportunities to use Big Data in higher education. However, most widespread academic analytics are limited to “reporting and compliance” as well as “analysis and visualization” (Bichsel, 2012). Higher education institutions collect and store a great amount of data, but they do not use them effectively (Davenport and Patil, 2012). They need to develop competencies to utilize data for “security and risk mitigation” and “predictive analytics” to gain strategic advantage benefiting institutions and various stakeholders.


The author Daniel (2015), points out that as higher education institutions adopt blended approaches to teaching, learning is happening more and more within online environments and platforms. The educational data mining community and learning modelling communities have already explored ways to track student behaviours, recording variables such as number of clicks and time spent on a page, and increasingly more nuanced information such as resilience and
retention of concepts. Inclusion of behaviour-specific data adds to an ever-growing repository of student-related information. Learning analytics is an emergent research area that intends to access and understand these data and adds a new dimension to the learning process.


According to the article, the authors Díaz-Lazaro, Fernandez, and Sanchez (2017) share that the development of more active methodologies among students at our universities and the incorporation of the emerging technologies have created spaces for collaboration that foster and encourage the active role of students in a climate which favors communication, relations and working together and with teachers and professionals with Web 2.0. tools and applications. So, knowing how these interactions work will give us a lot of information to adapt our teaching to how our students learn. The authors provide examples of this in the article including focusing on Facebook, Twitter, and etc.


This article talks about research surrounding analytics in higher education. Higher Education analytics have not been around that long. According to Gibson (2017), In this new era of data-driven learning and teaching, researchers need to be equipped for the change with an advanced set of competencies that encompass areas needed for computationally intensive research (Buckingham Shum et al. 2013). For example, new data-management techniques are needed for big data, and new knowledge is needed for working with interdisciplinary teams with members who understand programming languages as well as the cognitive, behavioral, social and emotional perspectives on learning. A new horizon of professional knowledge is needed, including new heuristics, which incline a researcher or teaching-researcher toward computational modeling when tackling complex research problems (Gibson 2012).


In this article authors Lawson, Beer, Rossi, et. al, (2016) tackle student using analytics in higher education by stating that in higher education, institutions are being challenged to increase their understanding of students’ needs. In response, a number of institutions have developed and implemented diverse technological approaches, which incorporate the use of learning analytics. Learning analytics has been defined as the collection and analysis of data in education settings in order to inform decision making and improve learning and teaching (Siemens, 2011; Van Barneveld, Arnold, & Campbell, 2012) whilst academic analytics is the process used by higher education institutions to support operational and financial decision making (Van Barneveld et al., 2012). It is aimed at governments, funding agencies, and administrators instead of learners and
faculty (Baepler & Murdoch, 2010). Educational data mining encompasses both learning analytics and academic analytics (Siemens & Baker, 2012) in order to understand the settings in which students learn (Chatti, Dyckhoff, Schroeder, & Thüs, 2012). Recently, concern has been expressed about the moral tensions (Willis, 2014) and ethical dilemmas associated with the processes of data collection, data mining and the implementation of learning analytics (Drachsler et al., 2015; Ferguson, 2012; Ferguson et al., 2014; Shum & Ferguson, 2012). This gives rise to questions relating to the purpose of data collection and how sensitive data will be handled (Oblinger, 2012). Lack of transparency in data collection and analysis has resulted in development of academic policy, particularly as it relates to the use of analytic data for student retention and support (Open University, 2014; Sclater & Bailey, 2015).


According to the authors Lester, Klein, Rangwala, and Johri, (2017), the articles learning and advising management systems, based on educational big data, or learning analytics, are being developed to better measure, analyze, report, and predict data related to student learning, retention, and completion. These learning analytics-informed systems have the potential to generate new insight into courses and student learning by creating responsive feedback mechanisms that can shape data-informed decision making as it relates to teaching, learning, and advising.


This article addresses the map of higher education and what is required for analytics or big data to be useful in it. Authors Mahroeian and Kei (2016), discuss how big data and analytics in higher education can be transformative, altering the existing processes of administration, teaching, learning, academic work. When analytics is applied, the traditional view of courses would be changed leading to a network of relations between knowledge and skills. Knowledge domains are mapped and a student can be evaluated with the help of the maps. The growing role of analysis techniques and technologies in government and business sectors affirms this trend.

analytics would lead to two types sustainable and disruptive innovation in education. Sustainable innovation would improve the existing system and processes. disruptive innovation would be new ideas, activities that require change in behavior or processes. innovation of this kind would remove the current practice and create a new system. in any institution both forms of innovation are required to adapt to the growing needs in higher education.


Higher education analytics is constant in growth. According to Picciano (2012), Colleges and universities need to meet a number of challenges that have already started to impact the elite position that American higher education has enjoyed for decades [22]. Some of these challenges are global and external to the higher education enterprise. As an example, a deep, extended recession has caused stress on the entire society especially on employment and state finances. Higher education has to rely on the political and economic sectors of the country to resolve this complex situation. However, there are issues that higher education can address in terms of expanding educational opportunity and thereby improving employment opportunity that go beyond opening doors for students. Higher education must strive to ensure that access means students can complete degrees. Online learning is part of the solution to this problem but student attrition in colleges and universities is at unacceptable rates and needs to be addressed as well. Data-driven decision making is already being used to help colleges identify and evaluate strategies that can improve retention. As data-driven decision making enters the big data and learning analytics era, these new approaches, while not silver bullets, may be part of the solution. Higher education administrators will do well by evaluating whether they can be used in their institutions and determining the role they can play.


According to the authors Rajni, and Malaya (2015), educational data combine offline data, online interaction data, and uncertain data. Offline data includes learner/educator information, students' attendance records, emotional data, course information, and data collected from the academic
section of an institution. Online and interaction data would be distance and Web-based education, computer-supported collaborative learning, social networking sites and online group forums, email, chat transcripts, Web clickstreams, and so on. Uncertain data include scientific measurement techniques and heterogeneity in designing data warehouses, sensor-generated data, privacy preservation process data, and data summarization.


Research covered on this topic by authors Howell, Seaman, and Gibson (2016), showed that while students expressed an appreciation that learning analytics could provide more personalized learning experiences, they held reservations about the functional impact of learning analytics on their education and sought the ability to make autonomous and personalized decisions about their learning. Further, they were concerned about the potential inequities resulting from learning analytics, and invasion of personal privacy. The findings highlight the need to engage students in the decision making process about learning analytics.


The use and availability of student dashboards can vary from university to university or college to college. Depending on the student, the navigation of the dashboard can be easy or difficult. According to the authors Roberts, Howell, and Seaman (2017), with the increased capability of learning analytics in higher education, more institutions are developing or implementing student dashboards. Despite the emergence of dashboards as an easy way to present data to students, students have had limited involvement in the dashboard development process. Perhaps the use of
the dashboard will increase if the students had more of a tutorial on how to use it or suggestions for what it entails.


This article address faculty performance under the umbrella of analytic data or technology integration. According to the authors Thanassoulis, Dey, et, al, (2017), with globalization of higher education, universities have become part of the services industry and in order to remain competitive university management has become increasingly concerned with students’ satisfaction. Students’ satisfaction with teaching and learning is considered as one of the major criteria for today’s university rankings (Douglas et al, 2006). Therefore, student evaluation of teaching (SET) questionnaires are increasingly used by higher education institutions to evaluate and improve teaching performance of individual teachers. The SET in conjunction with experts’ opinion may also be used to formulate strategies for enhancing students’ experience.


Wintrup (2017), discusses the concerns of students involving use of their personal information when they engage in university social media, twitter, google, and. While these are common for universities to engage in, some students do not want their personal information being displayed, in addition to their pages being linked to the university pages. There are some however, who value the use of these application within their course for it helps on the academic side when
working with other students. The assumption is that personal information cannot be leaked being that it is through a university that the pages or applications were created.


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According to Chang, Kao, Chu, and Chiu (2009), “There have been several models for defining and measuring learning styles, such as (1) Kolb (1984) proposed that learners can be
classified into convergent learners, divergent learners, assimilators, and accommodators (Kolb, 1984).” (p. 274) Teachers know and realize that students have different learning styles, and higher education students are no different. With the increased use of LMS there is a lack of actual, physical meeting of students and teachers, and a lack of hands-on experimentation that some students require in order to be successful. So one major challenge of LMS is how to reach those students that need that personal, hands-on interaction in order to be successful.


This article presents one challenge for learning management systems (LMS), and that is the inability of LMS to be able to keep up with the rapidly changing technology. This article had challenges that were similar to the Ros and Hernandez article. Technology changes at such a rapid pace that it is almost impossible for these LMS to keep up.


This article mainly deals with the problem of data in the use of classrooms. Over the years, students and teachers have faced the problem of not being able to access data once a course is over. Now, with the use of LMS, data is now retrievable infinitely.


Rivero (2015) states that, “today's LMS is predictably more accommodating to social learning and collaboration and mobile learning.” (p. 4) This article gives an in depth look at different types of learning management systems (LMS) for both higher education environments and workplace environments. Higher education environments use LMS to deliver instruction and coursework, whereas in the workplace LMS are in place for employees to be able to work collaboratively and to boost productivity.
According to the authors (2013), “Learning management systems (LMSs) are software systems for administrating, tracking, and reporting on e-learning programs.” (p. 26) There are several different generations of LMS, and they are rapidly changing due to the advances in technology that occur daily, even by the hour.


University of Buffalo, Center for Educational Innovation, Trends and the Future of Learning Management Systems (LMSs) in Higher Education
