Chapter 1
Big Data in Higher Education

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ABSTRACT

Big Data refers to large volumes of information – on diseases, ticket sales, and so on – that standard database tools such as MySQL and Oracle, cannot easily process. Thus, data analytics tools, such as InfoGram and Google Fusion Tables, are required to manage the information. The processed data is useful in several ways. For instance, public health officials may use the results of the analysis to explain the spread of viruses including the H1N1 virus (Mayer-Schönberger & Cukier, 2014, p. 2). Airplane companies may use the results to predict changes in ticket prices. Apart from the medical and aviation industries, institutions of higher learning also collect significantly large quantities of data. Hence, the analysis of Big Data also takes place in higher education. The beneficiaries of the analysis include students and administrators.

INTRODUCTION

The educational environment in the institutions of higher learning has considerably improved. Technological advancements are mainly responsible for the positive changes. Specifically, the introduction of data analytics in higher education – universities and colleges –made it easier for the management to make progress in key areas such as finance, student evaluation, and resource allocation (Bichsel, 2012). In other words, Big Data analytics aids college and university administrators to make predictions with respects to campus operations.

Before delving further into the uses of Big Data analytics in higher education, it is necessary to explain a few concepts about Big Data. Prior to the introduction of Big Data analytics, regular computers collected, contained, processed, and managed raw information. However, soon the data became so

voluminous that the traditional computers could not process it efficiently. This prompted engineers to overhaul the existing data analytics tools (Mayer-Schönberger & Cukier, 2014, p. 6). As a result, processing technologies such as MapReduce and Google's Hadoop were developed. These technologies manage terabytes of data by arranging the information in structured database tables. Thus, the database tables provide the raw materials for data analytics.

BACKGROUND

How to Use Big Data Analytics in Higher Education

The data analysis is a five-stage process. Firstly, the researcher needs to state the research question or objective that will drive the study. Thereafter, data that is relevant to the research question is collected. Thirdly, the analysis takes place. Normally, the objective of the data analysis is to establish forecasting parameters. Fourthly, the data analytics tool presents the results of the analysis in a manner that is simple to understand and interpret. In addition, the findings or recommendations should be actionable or practical (Bichsel, 2012). Lastly, the application generates reports that provide the feedback needed to evaluate the entire process. If the report shows that the analysis did not achieve the objective, then new research questions may need to be identified or different sets of data collected or both. So, do the institutions of higher learning follow the five-stage process?

According to Bichsel (2012), while a majority of colleges and universities are collecting large volumes of data, few use the information strategically. In other words, the use of Big Data analytics is not as extensive as it should be. Even when the tools are available, a considerable number of the users employ the applications in rudimentary tasks such as creating reports and filling credentials. However, some administrators are attempting to use Big Data analytics correctly. In this case, they employ the tools in enrollment management and budgeting. Sadly, the school managers have not yet tested Big Data analytics in resource optimization and administration, which are key aspects of higher education management.

Big Data analytics is effective if there is commitment, partnership, and investment. To begin with, the readiness of an institution to engage in the venture determines its commitment (Bichsel, 2012). Secondly, if research institutions, executives, and functional leaders work together, the users of the tools will reap optimal gains. Finally, the implementation of Big Data analytics succeeds if the managers of the institutions of higher learning perceive the technology as an investment rather than an expense. That said, implementing Big Data analytics is costly. This is because the institutions have to invest in expensive means of data collection (Bichsel, 2012). Additionally, often, the schools have to hire professionals to identify the key requirements for generating data models and provide suitable recommendations.

Besides the mentioned applications, Big Data analytics can significantly influence higher education in another way. Online tutorials are quickly replacing traditional lectures. In this case, instead of travelling to attend a class, a considerable number of students opt to take part in lectures through the internet. This is because the online tutorials enable students to save not only transport and accommodation fees, but also the time wasted in moving around campus from class to class (Guthrie, 2013). As a result, the institutions of higher learning have introduced massive open online courses (MOOCs). The MOOCs are a product of Big Data analytics.

In addition, Big Data analytics will enable educators to prepare effective assignments easily. Normally, the lecturers give students assignments and continuous assessment tests to gauge their understanding

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