

# Chapter 1

## Designing Online Learning Strategies through Analytics

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### ABSTRACT

*The online education environment is becoming complex day-by-day. Nowadays, educational institutes are offering various types of courses online to a large number of students having a diverse background, with the flexibility of time and geography. This results in creating a large repository of online data regarding courses, students and instructors. These data may be in text, audio or video format. This chapter is an attempt to understand the use of Learning Analytics that advocates for analysis of these data and to understand the learning process better in terms of student engagement, pedagogy, content and assessment. Educational institutes can utilize the intelligence revealed by learning analytics processes, and communicate them to those involved in strategic institutional planning.*

### INTRODUCTION

We live in an increasingly digital era, defined by information abundance and growing complexity. Rapid development in technologies has increased society's dependence on Information and Communication Technologies (ICT) for routine activities. We use these technologies for interacting with our family and friends, purchasing products, making travel reservations, filing income tax returns,

learning, and so on. As individuals conduct these activities, they leave their “digital footprints” or “digital bread crumbs” (Brown, 2011). These “digital footprints” or “digital bread crumbs” capture every detail regarding the user's interaction with any embedded enterprise-interface system such as time, location, keywords, search results, content created and consumed in the digital environment. These “digital footprints” can be analyzed using analytics to determine patterns and make predictions that can answer questions like: Which course is the most popular? Who are the students not performing well? Despite analyt-

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ics being common, many questions about them are still unanswered and opportunities exist for improved and refined analytics. Although banks and consumer-oriented retailers have been using sophisticated analytics for quite some time, its potential has barely been tapped in other fields. This chapter describes the current state and future challenges of analytics in one such field, that is, online learning, and commonly known as “learning analytics.”

Ally (2008) defines online learning as “the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience.” Educational institutes have introduced online learning in order to provide a platform for collaborative learning, increased interaction between instructors and students, and elimination of time and place constraints for learning and education. This not only results in improved quality of teaching and learning, but at the same time reduces costs and improves efficiency of educational services.

Learning analytics facilitates better understanding of the learning environment. This approach is profoundly based on the collection, analysis, and interpretation of collected educational data (Bader-Natal & Lotze, 2011). Through sophisticated analytic tools, investigation and visualization of large institutional data sets is improved (Brown, 2011; Buckingham Shum & Ferguson, 2011). Further, learning analytics helps in creating a far more robust and nuanced profile of students and offer deep insights to faculty members (NMC, 2013).

The chapter is structured as follows: Firstly, we present the concept of learning analytics and its difference with “Academic Analytics” and “Educational Data Mining.” Second, we will discuss the process of learning analytics which involves five steps (1) *Capture Data*, (2) *Structure and Aggregate Data*, (3) *Analyze Data*, (4) *Representation and visualization*, (5) *Action*, and

(6) *Refine*. Next we will discuss the role of learning analytics in designing and developing various online learning strategies, in designing of course pedagogy, content, course delivery and evaluation. The last section will include challenges of implementing learning analytics and future trends in online education.

## **ONLINE LEARNING**

In the emerging knowledge society, online learning is considered as one of the important alternatives to traditional face-to-face, instructor-led education. It enables us to deliver both learning and information at will, dynamically and immediately (Rossett & Chan, 2008). There are different terminologies used for online learning, including E-Learning, Computer-Assisted Learning, Web-Based Learning (WBL), Web-Based Instruction (WBI), Distributed Learning (DL), Advanced Distributed Learning (ADL), Distance Learning, Mobile Learning, Off-site Learning, Virtual Learning (VL), etc. Fundamentally, these terms imply that educational processes utilize Information and Communication Technology (ICT) to mediate and facilitate learning and teaching activities (Naidu, 2006). We are going to use the term “online learning” throughout the chapter. The term “online” in online learning incorporates all educational activities that are carried out by instructors, students or groups interacting synchronously or asynchronously via networked or standalone computers and other electronic devices (PDA, mobile, smartphones etc.) (Naidu, 2006).

Today, learners of all ages can explore the online learning environment and interact with instructors and peers using various online tools like threaded discussions, Webquests, blogs, podcasting, mashups, Webinars, video blogs, Real Simple Syndication (RSS) feeds, and virtual reality simulations. These tools offer learners great flexibility in terms of time and geography. On the other hand, online learning environment

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