

# Chapter 4

## From Learning Management System to Internet-Based Research in Mathematics Education

**Tianxing Cai**  
Lamar University, USA

### ABSTRACT

*A Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting, and delivery of e-learning education courses or training programs. The traditional distance education for mathematics has heavily relied on the application of LMS. However, the Standards for Mathematical Practice have provided the requirements to mathematics educators at all levels for the students' development. This chapter presents the introduction of the transformation from LMS to Internet-based research in the mathematical education. This is the viewpoint of the patterns, developments, changes, or phenomena within their respective fields with regards to distance education of mathematics. It also creates a broad, multidisciplinary understanding of online education across educational boundaries and demonstrates the unique future trajectories that online education has within these mathematics.*

### MOTIVATION

In the previous time period, the distance education is always depending on the learning management system (LMS) with the capability of administration, documentation, tracking, reporting and e-learning delivery and training. The typical examples of LMSs are training management, educational records, online distributing, online

blending/hybrid college courses. The schools can use LMSs to deliver online courses and augment on-campus courses.

LMS is also used in mathematical education. The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding

DOI: 10.4018/978-1-4666-6555-2.ch004

importance in mathematics education. They are problem solving, reasoning and proof, communication, representation, and connections, adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy). From the grade level content standards to the Standards for Mathematical Practice there is a need to provide examples about effective ways that technology can be integrated into mathematics classrooms. For example, based on an online monitoring result, the data integration technologies will be applied to identify the change scenarios and the dynamic pollutant monitor result, so as to timely and effectively support diagnostic and prognostic decisions. Qualitative and mixed methods researchers have employed a variety of information and communication technology tools, simulated or virtual environments, information systems, information devices and data analysis tools in this field. With the collection and representation of information in a range of ways, software tools have been created to manage and store data. This data management enables more efficient searching ability of various types of digitized information. Various technologies have made the work of research more efficient. The results of the qualitative or mixed methods research may be integrated to reach the research target. Right now, a lot of software tools are available for the analysis to identify knowledge patterns and represent new meanings. The programs extend the capabilities of the researcher in terms of information coding and meaning-making. Machine-enhanced analytics has enabled the identification of aspects of interest, such as correlations and anomalies, from large datasets.

In this chapter, we will present the introduction of the transformation from LMS to Internet based research in the mathematical education. This will be the viewpoint of the patterns, developments, changes, or phenomena within their respective fields with regards to distance education of mathematics. It will also create a broad, multidisciplinary understanding of online education across educational boundaries and demonstrate the unique future trajectories that online education has within these mathematics. Actually, mathematical methods and techniques such as ordinary and partial differential equations, stochastic processes, calculus of variations, and nonlinear analysis are typically used in engineering and industrial fields; in particular, aerospace engineering, bioengineering, chemical engineering, computer engineering, electrical engineering, industrial engineering and manufacturing systems, and mechanical engineering are of interest. Along with fields like engineering physics and engineering geology, it can also become an interdisciplinary subject motivated by the engineer's need for practical, theoretical and other considerations with their specialization while dealing with constraints to be effective in their work. Contributions containing formulations or results related to applications have become very common. Therefore, the solid understanding and command of mathematical knowledge is very necessary.

## **INTRODUCTION OF LMS**

The LMS should have various modules. Based on the Microsoft's recommendation (Microsoft, 2014), it should contain three different roles of educators, students and administrators. The role of educators should be capable of resource sharing, activity assignment, marking, virtual classroom, planning, my site, news, information. The student module should have assignment inbox, e-portfolio, virtual seminars, planning, my site, news, informa-

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