Chapter 14
From Adaptive Learning Support to Fading Out Support for Effective Self-Regulated Online Learning

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ABSTRACT

This chapter applies data mining and learning analytics, along with self-regulated learning (SRL) theories, to examine possible interventions aimed at supporting students' success with online learning. The chapter introduces two learning support systems and the results of related research. These two systems are used as sample cases to describe the relationships among SRL, learning support, learning processes, and learning effects. Case 1 is an early warning system that uses an SRL questionnaire completed before actual learning to determine which students are likely to drop out. Case 2 focuses on student planning and the implementation phases of the SRL cycle. This system supports students' own planning and learning, creating distributed learning and reducing procrastination without human intervention. A comparison of the two cases implies that a combination of an early warning system and system constraints that require planning before actual learning can reduce the need for human learning support and decrease academic procrastination, resulting in increased distributed learning.

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INTRODUCTION

This chapter examines how to provide more effective learning support as well as how to foster students' self-regulated learning using learning technology, particularly learning analytics, by presenting two case studies related to the development of two learning support systems. While online learning has become common in higher education, it faces serious challenges, including high dropout rates, procrastination, and the cost of learning supports. Learning technology, including learning analytics and expanded learning support systems using artificial intelligence, are expected to improve the quality of online learning experiences. In this chapter, self-regulated learning (SRL), which is generally identified as necessary for successful online learning, is used as a core theory to address related issues, improve learning support, and introduce possible solutions. The targeted fields are both full and hybrid online learning courses offered by accredited universities. Non-credit MOOCs (massive open online courses) are beyond the scope of the current research. The authors have been researching SRL and learning support in the online learning setting for more than 15 years. Students need SRL skills to be successful in online learning and thereby reduce dropout rates in online courses. Therefore, this chapter will discuss possible learning supports for higher education online courses; the proposed supports are based on the theoretical framework of SRL and were developed using learning analytics and data mining techniques.

Research has shown that data science has the potential to predict students' achievements. The results of SRL studies and data science were used to develop support systems for online learning. Each system was examined in a case study, and adaptive learning supports, including the best way to fade out such supports, were considered. The relationship between the application of learning technology and learning supports will be illustrated via the two case studies. In both case studies, a support system for online learning was designed and developed.

This chapter is divided into six sections, the first of which presents the introduction; section 2 introduces related literature and previous research, while section 3 describes the research methods applied for the two case studies described here. Section 4 compares the two approaches to online learning support and their effects on students' learning. Section 5 discusses the findings of the case studies and addresses the implications of this study for future practice and research. The last section identifies how gaps in the literature have been addressed, thereby demonstrating an important contribution of this study.

BACKGROUND

This section will review previous related literature, after which a summary of the chapter and its scope will be provided. The section includes literature on SRL, online learning behaviors (including academic procrastination), learning supports for online learning, and learning support systems that implement learning predictions and visualizations of the learning process.

SRL in Online Learning

Online learning offers students more flexibility than traditional classrooms with regard to time and place. That said, it also requires students to have better SRL skills than those exercised in traditional face-to-face learning environments (Goda et al., 2013; Lynch & Dembo, 2004; Michinov, Brunot, Bohec, Juhel, & Delaval, 2011). SRL involves strategically planning, monitoring, and regulating one's cognition,