

# Chapter 4

# Upload, Download, Overload!

## An Empirical Study of Online Design and Organization Factors that impact Learning Outcomes and Reports of Overload

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### **EXECUTIVE SUMMARY**

*Students often complain of overload in online learning environments. Discussions here consider online design and organization factors that might contribute to students' reports of overload. This study explored predictions that 1) students' past online experience, 2) the organization of online environments and relevance of online material with which students work, and 3) the level of task difficulty impact (a) student learning outcomes, (b) students' reports of overload, and (c) students' perceptions of having enough time to complete assigned course work. A total of 346 participants were tested in two experiments that manipulated the organization of the online environment and the material that students had to learn. Experiment 1 tested how the organization of the online environment impacted learning outcomes. Findings suggested that online environments that are overly busy and that contain irrelevant information (i.e., stimulus-rich or "stimulus-noisy" online environments)*

DOI: 10.4018/978-1-4666-1933-3.ch004

*had a negative impact on experienced, savvy online learners, but no impact on students less experienced with online learning environments. Surprisingly, results here suggest that overload affected only experienced students. Experiment 2 tested how the organization of the online material (that students had to learn) impacted learning outcomes. Findings suggested that online learning environments that used hypertext to organize material had a negative impact on student learning outcomes, misconceptions of information, and perceived overload. This chapter examines literature that considers design and organization factors that can impact online learning, and considers design strategies for online teaching environments and strategies for avoiding factors that can leave students feeling overloaded.*

## **SETTING THE STAGE**

Students registered in courses using online learning environments often complain of overload, that they are unable to manage and process what appears to them to be vast amounts of information, and they often complain about disproportionate amounts of time that they must spend on the online components of courses using online learning environments compared to traditional face-to-face courses that do not use such environments (Chen, et al., 2011; Kushnir, 2004; McGuire, 2010).

There is a substantial body of education research that describes a range of factors that influence perceptions of overload and that can impact educational outcomes for students using online learning environments (for example, Antonenko, et al., 2010; Carey & Kacmar, 1997; Chen, et al., 2011; DeStefano & LeFevre, 2005; Lee & Tedder, 2003; McGuire, 2010; Stanton & Barber, 1992; Zumbach, 2006). Three factors considered here to be “major component parts” of online learning are 1) student characteristics, 2) interface design, and 3) instructional design. These three factors are viewed to be interacting components that make up online learning environments and they can have a variety of associated variables that likely interact with one another, and likely impact learners in many ways.

Figure 1 illustrates a model of variables associated with the three component parts of online learning technologies. These components and the associated variables are not viewed as a comprehensive model, rather the model simply represents a sample (of a wide-ranging list of variables that one could possibly generate) that can be particularly important for online learning.

In this chapter, we focus on only three of the associated variables: (1) students’ computer experience with online learning technologies (*i.e.*, User Characteristics: experience in Figure 1), (2) the organization of online information and the relevance of the information to particular online tasks (*i.e.*, Interface Design: organization of environment and relevance of information in Figure 1), and (3) the nature of online

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