Chapter 3
How Digital Distractions Influence Learner Information Processing

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ABSTRACT

The use of digital technologies in the classroom continues to rise as more students take lecture notes on laptops rather than pen and paper. In addition, digital technologies can greatly influence student behavior. Indeed, these devices can lead students to engage in unrelated online activities during a lecture. Obviously, these activities can have negative consequences on student learning. This chapter aims to provide an understanding to how digital distraction influences learners' information processing. First, this chapter will present how students process instructional material and explore effective strategies for high-quality learning. Second, this chapter will investigate how digital distraction disturbs information processing based on the cognitive load theory and contiguity principle. Third, this chapter will focus on the effects of digital distraction on student notes and learning. Fourth, this chapter will offer recommendations for curbing digital distraction.

INTRODUCTION

Digital technologies like laptops, smartphones, and tablet computers are widely used in the classroom, influencing students' off-task behaviors and information processing (Jamet et al., 2020). To ensure high-quality learning, students must engage in active generative processing by selecting and organizing relevant information into a coherent mental representation before integrating it with prior knowledge (Mayer, 2020). To undertake these processes, learners must devote their attentional and cognitive resources toward relevant information. However, digital distraction causes many students to devote resources to unrelated information, including instant messages, social media, or online browsing.

It is critical for both learners and teachers to understand how college students learn and how digital distraction influences information processing. To this end, the chapter will first present how college

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students process instructional material based on key models in educational psychology. Then, the chapter will expose the negative effects of digital distraction on student learning. Finally, the chapter will provide recommendations to help instructors curb student digital distraction in the classroom. Learners will also benefit from these recommendations as they understand the need to self-regulate in-class learning behaviors to avoid the negative effects of digital distraction.

BACKGROUND

How do college students process information when studying a lesson? Which effective learning strategies should learners adopt to effectively and efficiently process information? This section introduces key models in educational psychology that explain the learning process. It will also focus on effective learning strategies that can promote student learning.

COLLEGE STUDENTS AND LEARNING

The cognitive theory of multimedia learning (CTML), developed by Richard E. Mayer, is a well-known model in educational psychology (Mayer, 2001, 2009, 2020). This model describes how people learn from words and pictures. These "multimedia documents" are widely used in educational settings. Indeed, many instructors present lectures via PowerPoint slides with text and illustrations. Therefore, it is critical to understand how this information is processed in memory to promote the use of effective learning strategies that improve college students' learning. CTML (Mayer, 2020) relies on three critical assumptions.

First, the dual-channels assumption refers to the fact that "humans possess separate information processing channels for visual/spatial material and auditory/verbal material" (Mayer, 2020, p. 34). For instance, when attending a lecture, college students may be required to process the speech of their lecturer and visual information like a passage from a textbook, written information, or illustrations on a whiteboard. Students process the details through different channels. Verbal information will be processed in the auditory/verbal channel; written text and illustrations will be processed in the visual/spatial channel. Learners can also transform a piece of information and process it in both channels. As an example, when viewing an illustration of an animal, learners can automatically retrieve the name of the animal from their previous knowledge and long-term memory. This transforms visual information into verbal and vice versa. This dual-channels assumption stems from Paivio's (2006) distinction between verbal/nonverbal systems in his dual coding theory and from Baddeley's components of the working memory model (phonological loop versus visuospatial sketchpad, see Baddeley, Eysenck, and Anderson [2015], for a detailed presentation).

The model's second assumption is based on humans' limited cognitive capacity. More specifically, this assumption relies on the fact that "humans are limited in the amount of information that can be processed in each channel at one time" (Mayer, 2020, p. 36). It is common for people to forget information immediately after seeing or hearing it. Indeed, our memories cannot retain all the information around us due to our limited memory capacities. Therefore, this assumption is critical to consider in academic learning situations. The next section in this chapter focuses on this assumption based on Sweller's (2005, 2020) cognitive load theory.