Chapter 4
Self–Regulated Strategies and Cognitive Styles in Multimedia Learning

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ABSTRACT
An experiment was carried out to investigate how participants self-regulate their access to explanatory pictures that were designed to facilitate learning. Participants learned from two multimedia presentations, one in audio, and the other in video format. Participants were given the opportunity to ask for an explanatory picture when they felt they needed more information to better understand the text. Recording the requests for pictures assessed self-regulation of strategies that promote picture use. Before completing comprehension questions, participants explained why they asked for pictures and were asked to express their level of awareness of the cognitive processes involved in learning from pictures. Two questionnaires were administered to measure the right/left thinking styles and the spontaneous tendency to use mental images. Results showed that participants, without full awareness, self-regulated their cognitive strategies according to presentation complexity. Judgments of picture utility were internally coherent. Finally, cognitive styles played a minor role in self-regulating learning, but tended to influence the metacognitive awareness of the strategies applied.

DOI: 10.4018/978-1-61692-901-5.ch004
INTRODUCTION

Multimedia learning materials can provide learners with rich educational environments where concepts can be learned in multiple formats: written texts, oral narratives, static pictures, animated videos, etc. Numerous theoretical and empirical questions come to mind when considering multimedia-learning materials. While considerable research has attempted to understand when and why presenting the same content both visually and verbally can foster learning, this chapter, on the other hand, is concerned with whether participants are able to identify optimal strategies for using multimedia learning materials when learning a new concept.

Paivio’s (1986) dual-coding theory has provided a rich foundation for research on multimedia learning. Dual-coding theory contends that verbal and non-verbal information are processed in parallel and therefore normally do not compete for resources. Verbal representations are composed of words for objects, events and ideas while non-verbal representations are embedded in non-verbal representations with some resemblance to the perceptions that give rise to them.

Mayer’s (2001; 2005) Cognitive Theory of Multimedia Learning is an applied model that has tested Paivio’s dual-coding theory with multimedia learning materials. Mayer’s theory is an empirically supported model inspired by a learner-centered approach. According to the theory, people learn better if information is learned via both systems, that is, when learning occurs with verbal and non-verbal information, than with verbal information alone. Such a general principle was specified by a set of sub-principles experimentally tested by Mayer and his colleagues (Mayer, Moreno, Boire & Vagge, 1999; Mayer, Dow & Mayer, 2003; Mayer & Moreno, 2003). These principles include:

- Spatial contiguity: Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or on the screen.
- Temporal contiguity: Students learn better when corresponding words and pictures are presented simultaneously rather than successively.
- Coherence: Students learn better when extraneous material is excluded rather than included in the presentation.
- Modality: Students learn better from animation and narration than from animation and on-screen text.
- Redundancy: Students learn better from animation and narration than from animation, narration, and text.

A body of research suggests that individual differences in cognitive style might significantly influence how one would learn from a multimedia-learning environment. In this chapter we tested how participants, tested for individual differences in cognitive style, would differentially self-regulate their access to relevant pictures (that were designed to facilitate learning) in a multimedia learning environment.

We will first review cognitive styles, then we will discuss relevant questionnaires for measuring individual differences in cognitive style, and before we discuss the study, we will briefly turn our attention to self-regulation, which is crucial for any learning environment.

Cognitive Styles

The efficacy of the principles drawn from Cognitive Theory of Multimedia Learning varies depending on individual differences. Antonietti (2003) argues that cognitive styles (e.g., visualizers, verbalizers, etc.), which can be defined as the way an individual perceives, remembers and re-elaborates information, modulate people’s way of dealing with information, effectiveness of cognitive processing, and learning in general. For instance, those who prefer to process information