

# Chapter XIII

## Fostering Transfer in Multimedia Instructional Environments

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### ABSTRACT

*The role and promotion of transfer in multimedia instructional environments is an oft-neglected concept in instructional multimedia research. However, while most instructional multimedia research does not focus specifically on transfer, the majority of basic multimedia research conducted uses retention and transfer as dependent measures. The purposes of this chapter are to (a) provide a review of the current state of the transfer literature, (b) provide a synthesis of the existing literature on the evidence for transfer in multimedia instructional environments, and (c) provide a series of strategies for constructing and using multimedia for the purpose of fostering transfer. The significance of proactively creating multimedia instructional environments that fosters transfer lies in the benefits of creating knowledge that may be generalized and applied in the “real world.” Specifically, knowledge that may be generalized, applied, or transferred broadly facilitates the learner’s ability to solve problems of all types. In addition and unfortunately, even under the best of conditions, fostering transfer is challenging; thus, a proactive stance in fostering transfer is necessary to increase the likelihood of generating knowledge transfer.*

## INTRODUCTION

Multimedia instructional environments have become an integral part of modern education. Through the use of simulations, tutorials, games and animations, multimedia has become a bona fide instructional strategy. As multimedia is used with greater frequency in educational contexts, however, questions arise as to the efficacy of multimedia instruction in fostering cognitive change. Current research addressing the efficacy of multimedia instruction has found mostly positive, though some negative, results on cognitive performance as measured by recall and transfer of multimedia instructional episodes. In several cases, variation in performance is evident by significant transfer effects in the presence of non-significant recall effects (e.g., Mautone & Mayer, 2001). This variation across recall and transfer is not entirely surprising as there is evidence that transfer may be a more sensitive measure of learning than basic recall (Bransford & Schwartz, 1999). Therefore, as instruction ventures into the realm of multimedia instructional environments it is imperative that transfer become a central pillar in multimedia research. The objectives of this chapter are to (a) provide a review of the current state of the transfer literature, (b) provide a synthesis of the existing literature on the evidence for transfer in multimedia instructional environments, and (c) provide a series of strategies for constructing and using multimedia for the purpose of fostering transfer.

## BACKGROUND

Multimedia learning involves learning from instruction that involves more than one type of media (e.g., computer, speakers), modality (e.g., visual, auditory), and/or representation (e.g., animation, narration) (Reed, 2006; Schnotz & Bannert, 2003). For example, Mayer and Anderson (1991) found that students learned more from a multimedia

tutorial addressing “how a tire pump works” that included both an animation *and* a narration as opposed to an animation or narration only. Research into multimedia learning has determined that, in general, multiple forms of media, modalities, and representations facilitate learning (e.g., Eilam & Poyas, in press; Mayer, 2005). This research into multimedia learning tends to focus on knowledge recall and transfer as dependent measures. The current chapter focuses on the dependent measure of knowledge transfer.

An examination of knowledge transfer in multimedia learning needs to begin with an understanding of transfer, in general. Knowledge transfer can be described as the ability to use or apply knowledge learned from one problem, situation or context to different problems, situations or contexts (Salomon & Perkins, 1989). In education, the goal is that knowledge learned in the classroom will be transferred to problems and situations outside of the classroom. Unfortunately, this goal is not always achieved and students are often unable to transfer information to contexts other than the one in which the knowledge was first learned (see Detterman & Sternberg, 1993). Detterman and Sternberg, in a review of the transfer literature, state: “First, most studies fail to find transfer. Second, those studies claiming transfer can only be said to have found transfer by the most generous of criteria” (p. 15). That said, transfer *is* evident in the literature on learning (see Fuchs et al., 2003; Georgiades, 2000; Singley & Anderson, 1989) and must be addressed in a comprehensive theory or approach to multimedia learning.

Researchers in the area of learning have studied the concept of transfer in academic settings for decades. Edward Thorndike, in the early 1900s, developed the “identical elements” theory of transfer that posited that the amount of transfer between familiar and unfamiliar situations is determined by the number of elements the different situations have in common (Thorndike, 1903; Thorndike & Woodworth, 1901). He argued that this was the

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