# Student–Generated Multimedia

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## INTRODUCTION

This entry looks at the role of student-generated multimedia (SGM) in helping students more effectively achieve meaningful outcomes. The entry first looks at the theory and research behind multimedia learning and then goes on to address the specific case of student-generated multimedia. Mayer (2001) defined multimedia as the presentation of material using both words and images, and then subsequently defined multimedia instruction as a "presentation involving words and pictures that is intended to foster learning" (p. 3). The implications of these definitions are important because they delineate two key aspects to thinking about multimedia. First, multimedia products do not need to use video, animation, or interactivity. More importantly, Mayer's definitions focus on multimedia's potential benefits as a learning tool rather than as a technological device.

While there has been a strong body of research supporting the learning benefits of multimedia under specific conditions (e.g., see Mayer, 2001), there has been little research done on the potential benefits of student-generated multimedia. Within the larger context of educational thinking, this seems odd as there is general support for the basic idea that students learn better if they are the authors or creators of significant learning products (e.g., see Reigeluth, 1999). The theme of the constructivist research base has been that students tend to construct a deeper understanding of content if challenged to solve ill-defined problems within a relevant, real-world context. More specifically, there has been a consistent body of research that indicates students learn conceptually demanding material better when they construct self-explanations (Chi, 2000). One of the hallmarks of well-designed student-generated multimedia challenges is that they seem to invoke the self-explanation effect. Despite these factors, relatively little attention has been paid to the potential benefits of SGM. In a recent book (Brown, 2000) containing 93 vignettes from America's "most wired campuses," only five of the vignettes were about student-generated products. A more recent article investigating computer-using activities of both teachers and students (Zhao & Frank, 2004) used no measure of student-generated products. They looked at high-school classrooms, but the nearest measure to SGM was labeled "student inquiry," and their results indicated that less than 14% of students engaged in these inquiry kinds of activities such as conducting student research using the Web. Given that computer technology provides great opportunities for students to relatively easily and effectively create significant learning products, it would seem reasonable that future research into computer-learning technologies explore the arena of SGM.

## WHY MULTIMEDIA?

If the learning of specific material is easily accomplished by most students, then there is no need to incorporate multimedia instruction. For example, creating a multimedia product is typically more time intensive relative to the creation of a new text product. Thus, using multimedia makes the most sense if the specific learning challenge for students is difficult for them to master using traditional methods of instruction. In such a case, multimedia products may provide the extra instructional boost that will make a difference to learners mastering difficult material. Mayer's (2001) cognitive theory of multimedia provides an explanation for *why* the appropriate use of multimedia can be especially helpful in learning complex concepts.

Consistent with the above line of thinking, SGM is probably best incorporated into the learning environment when the conceptual material under study is both difficult and essential for students to master. After all, to create multimedia, students need to

learn about creating images and audio, they still need to know how to use text, and typically the most difficult design challenge is integrating all of these elements into one cohesive product. However, multimedia learning challenges may more effectively facilitate students' learning of complex material at a much deeper level than possible with exams or papers. For example, take the case of analysis of variance for doctoral students. This statistical concept and technique is both challenging for them to understand well and essential for their future work as academics. Under these conditions it may make sense to incorporate SGM learning challenges into the classroom. However, for simpler conceptual material such as finding the mean, it is likely an inappropriate use of time and resources to use SGM challenges. Of course, what is challenging and essential for students is dependent on grade level and a variety of other factors. Yet, given that a teacher, a department, or a school has identified particularly difficult-to-achieve outcomes, they may want to consider using SGM learning challenges. An additional benefit to using a multimedia approach to learning conceptually challenging material is that it is much more flexible compared to text-based approaches (such as essay papers) in terms of meeting the needs of learners with a wide array of learning styles. This is because multimedia allows learners to demonstrate their understanding using more than one mode of communication. As this entry will discuss in more detail below, the main potential benefits of well-designed SGM instructional challenges is that they tend to facilitate active learning in students through self-explanation and relevance.

## A COGNITIVE THEORY OF MULTIMEDIA LEARNING

It is difficult to understand the value of SGM without a grounding regarding the cognitive benefits of multimedia learning in general. A leading cognitive researcher in terms of the learning benefits of multimedia is Richard Mayer (2001). While other researchers have proposed models of multimedia learning (e.g., Hede, 2002), Mayer's model (see Figure 1) seems the most complete based on a strong foundation of closely aligned research.

The focus of Mayer's (2001) model is on meaningful learning (operationally measured as transfer or problem solving in most studies). However, if the type of learning outcomes desired can be described as the retention of facts, then multimedia formats for learning seem no better than other formats such as text (Mayer).

Mayer's (2001) model describes what optimally happens when active learning is going on. Specifically, Mayer defines active learning as the three-pronged process of selecting, organizing, and integrating information. The basic idea is that when active learning is optimized, then meaningful outcomes can be more effectively reached. In his model, information is presented through words or pictures. Note that words can be taken in primarily through the ears or the eyes depending on whether one is using audio narration or written text. Mayer's model predicts that we select from the presented information a subset of it that will be processed in working memory. This selection of information (in the form of sounds and images) is next organized into

*Figure 1. Mayer's cognitive theory of multimedia learning*
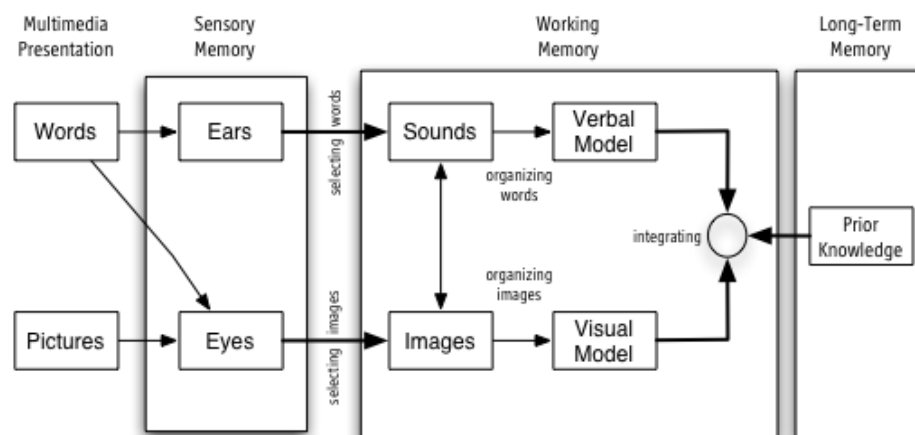
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