Chapter 6
Web 2.0 Visualization Tools to Stimulate Generative Learning

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ABSTRACT

Twenty-first century learners' learning experiences require vastly different instructional opportunities than the generation before. These electronically bred learners have become "wired" to learn best from and to prefer instructional activities that allow them to manipulate their learning environment. With this understanding, educators should respond with instructional practices that not only support learners' fundamental and preferred learning behaviors but also provide environments that foster creative and critical thinking experiences. New Web 2.0 educational technologies can help educators to deliver rich instruction that is relevant, appropriate, and that affords a "playground" in which generative learning can take place. This chapter introduces readers to a category of interactive technology instruments called visualization tools and how these tools can be used to stimulate generative learning. Examples are provided and criticisms of text visualization tools are also carefully considered. Readers are challenged to explore new uses for and the impact of visualization tools.

INTRODUCTION

Twenty-first century learners have increasingly become a generation whose learning experiences require and afford vastly different instructional opportunities than the generation before. Not only

do today's learners prefer to engage in learning activities that allows them to manipulate their learning environment, but they have also become "wired" to do so. With this understanding of 21st century learners, educators should respond with instructional practices that not only support learners' fundamental and preferred learning behaviors. According to Considine, Horton, and Mormon

(2009), "today's teenagers bring to school a rich and different set of literacy practices and background that is often unacknowledged or underused by educators" (p. 471). Rather than viewing digital media as a distractor in the education system, it should be embraced as an opportunity. New Web 2.0 educational technologies abound that can help educators to deliver rich instruction that is relevant, appropriate, and that afford a "playground" in which generative learning can take place.

While new Web 2.0 technologies surface every day, this chapter introduces readers specifically to a category of interactive technology instruments called visualization tools. Visualization can be defined as the conversion of information to a symbolic representation of a particular idea, concept, or data object. According to Burley (2010) visualization tools are used to organize, integrate, and display a large amount of information into a more easily understood format. These representations often reveal patterns, relationships, and concepts with potential for new understandings and deeper comprehension of reading materials.

The chapter begins with an introduction to current visualization tools and an overview of generative learning theory. Next a discussion about how text visualization tools can stimulate generative learning will be shared. Criticisms of text visualization tools are also carefully considered and presented for the readers' review and evaluation. The authors' experiences with text visualization tools in their own instruction are provided as supportive examples. The chapter concludes with an exploration of other uses for text visualization tools and makes a case for integrating text visualization tools into teacher education programs.

WEB 2.0 VISUALIZATION TOOLS

Visualization tools are interactive in design, thus information becomes more accessible and allows users to explore text in a way not afforded by traditional reading and processing of text alone. Uploading or pasting text into one of these visualization tools lets users create images that point to possible relationships, main ideas, and key terms. These images can facilitate the process of content analysis and quite possibly expand reader comprehension. Early proponents reported successful use of visualization retrieval tools to present bibliographic displays generated from huge amounts of digital information (Koshman, 2005; Rorvig & Lunin, 1999; Shneiderman, (1998). According to Wise et al. (1995) data sources become manageable and information retrieval efficient through organized graphic displays. Zhang refers to these visualizations as metaphors. Mental images can be formed and conceptual ideas more easily recognized, communicated, understood, and remembered (Zhang, 2008). Knowing that people recall 10% of what they read when tested three days after exposure compared to 65% if a picture or visual element is added (Medina, 2008), visualization tools may even support long term recall of information read.

While a number of visualization tools exist on the web, this chapter will highlight those on the Many Eyes web site (manyeyes.alphaworks.ibm.com). This particular web site was selected due to its comprehensive selection of visualization tools made available to users. Also discussed is the web site Wordle (www.wordle.net). .

Many Eyes was developed by researchers from the Visual Communications Lab, a subgroup of IBM's Collaborative User Experience research team, as a means to help people collectively understand data. Because visualizations created are published on the web site for public viewing and solicit comments, Many Eyes transforms information into a participatory, social experience. Many Eyes offers several interactive technology instruments to transform both textual and numerical data. What follows is a brief description of four tools: Word Clouds, Phrase Net, Tag Clouds, and Word Trees.

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