New and Emerging Data Visualization Tools

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Sharan Merriam (2009) remarks that “qualitative research has become a mature field of study with its own literature base, research journals, special interest groups, and regularly scheduled conferences” (p. vii). Many researchers who employ qualitative methods prefer to wade through piles of interview transcripts and collections of artifacts, but there are software tools available to help with the data analysis process. The American Evaluation Association (“Qualitative Analysis,” 2010) lists thirty-five software tools designed for analyzing various forms of qualitative data: text, audio, and video. These tools range in price from free to thousands of dollars depending on a user’s licensing and feature needs. Some tools simply assist with the organization of data or the coordination of tasks between research team members, but some provide features that may aid researchers with data analysis. One of those features, data or information visualization, is the topic of the present discussion.

The phrasing “data visualization” is used in the title of this article to stress the word data. The focus of this discussion is the possible usefulness of tools to visualize text data collected during research studies conducted with qualitative methods. There are related and overlapping fields of study involving visualization (e.g. scientific visualization, data visualization, and information visualization). The most appropriate of these fields for the purposes of qualitative research involving text artifacts is information visualization. Information visualization is defined as “the use of computer-supported, interactive visual representations of data to amplify cognition” (Card, Mackinlay, & Shneiderman, 1999, p. 6). The purpose of information visualization is to “communicate complex ideas to its audience and inspire its users for new connections” (Chen, 2010, p. 387).

Card, Mackinlay, and Shneiderman consider the foundational period of information visualization to be the period from the introduction of the Silicon Graphics workstation in the 1980s to the end of the 1990s when desktop personal computers’ standard configurations became capable of displaying sophisticated graphics. Indeed, what many would consider seminal work (e.g. Tufte, 1983), in this area took place in that time period, though Tufte’s work involved static graphics. Visualization is still a topic of interest with David McCandless (TED, 2010) recently offering it to audiences outside of visualization researchers as a solution to information overload, which will allow us “to see the patterns and connections that matter.”

The notion of using visualization techniques in qualitative research is not new. For example, Ruberg & Moore (1994) and Horney (1994) applied visualization techniques to analyze discussion data. Some recent examples of visualization in qualitative analysis can be found in the areas of expertise development in online games (Chen, 2009) and the teaching of writing (Sorapure, 2009). The adoption of visualization techniques in qualitative research though has not become widespread, and some qualitative researchers have recently noted a need for visualization tools (Slone, 2009).

Authors have noted benefits of using visualization techniques in qualitative research. Horney notes that visualization techniques have highlighted “areas where data analysis should be reconceptualized” (p. 39) and can “lead researchers into deeper and alternative investigations of their data” (p. 39). Also,
visualization techniques for qualitative research data “may address transferability and confirmability” (Slone, 2009, p. 490).

The practice of qualitative research may be a mature field as noted by Merriam (2009), but it continues to evolve. The incorporation of new technologies is one new and expanding area for qualitative research. Chen (2010) notes that research in information visualization using emerging, online, social networking tools is just beginning. The Merlien Institute is organizing an international conference in 2010 (“International conference on Qualitative Research in Web 2.0,” 2010) aimed specifically at examining the intersection of Qualitative Research and emerging Web 2.0 tools.

Writer Darcy Dinucci (1999) introduced the term web 2.0, which was later popularized by Tim O’Reilly (2005). Web 2.0 is a philosophy of software design describing “many individual tools that have been created with web collaboration, sharing, and/or new information creation in mind” Oliver (2007, p. 55). Many articles have been written about the benefits, or potential benefits, of using Web 2.0 tools in the teaching and learning process, and instructional technology researchers have been key contributors to this area of the professional literature. Qualitative research methods are valuable tools frequently used in research and evaluation of educational and instructional technologies. Therefore, it is time to also apply these new tools to research and evaluation in the field of instructional technology. “Web 2.0 infovis [information visualization] applications can enable us … to producing visual representations of information” (Sorapure, 2009, p. 60). The use of free, online tools allow users to “come to greater insight about the text” (Sorapure, 2009, p. 62). Examples of web 2.0 tools that show promise for use in qualitative research include: wordle (www.wordle.net), IBM’s Many Eyes (http://manyeyes.alphaworks.ibm.com/), TextArc (http://www.textarc.org/), and TAPoR (http://portal.tapor.ca/portal/portal), the Text Analysis Portal for Research. These tools can be as simple as word cloud creators (e.g. Wordle) which use simple word frequencies to more complex tools aimed at identifying themes in text (e.g. TAPoR).

The utility of simple tools such as the word cloud generator Wordle for qualitative research may be questioned, but it has proven useful in at least one related context. Sorapure (2009) utilized word clouds in her writing courses and reported that her students were led to “reexamine the influence of her [the student’s] own bias” (p. 64) in an analysis of two text artifacts. This shows that there may be potential for qualitative researchers to use it for similar purposes while analyzing data. It is time to design studies to test the efficacy of using tools like the ones mentioned here for qualitative research.

The advent of computer tools and capabilities for creating information visualization appear to have advanced ahead of theoretical groundings (Chen, 2010). As such, the field is an excellent fit for Instructional Technology researchers who are typically viewed as working in a linking science between fields such as Educational Psychology and practitioners. In this venue, Instructional Technologists are positioned well to apply Educational Psychology, emerging online tools, and qualitative research methods to achieve the “insight” (Chen, 2010, p. 388) information visualization hopes to offer its users.
References


