Making Sense of Social Studies with Visualization Tools

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On January 20, 2009, Americans witnessed a historical event as Barack Obama took the oath of office and became the 44th president of the United States. While the general population reflected on the event, students in a U.S. government course were busy analyzing the inaugural address. In the past, they might have written their own reflections on the central themes, considered how to connect the messages in the speech to their lives, and explored similarities and differences among inaugural speeches of other American presidents. Many online resources could have facilitated the engagement of these students as observers and participants in this historical moment.[1] However, this class participated in a unique social networking experience in which they used a web-based analysis tool to develop a visual representation of the speech, also known as a word cloud. The cloud stimulated a collective interpretation of the political, social, and economic circumstances that led to President Obama's choice of words on his Inauguration Day.

A word cloud organizes text to show the most commonly used words in a selected passage. It identifies various iterations of words and groups them under the most common variation (e.g., "elect," "electing," "elected," and "elects" might be included under "election"). As you scroll through a word cloud, higher frequency words appear larger than other text and are differentiated by weighted fonts. In the analysis of a speech, punctuation and commonly used words that do not add to the focus of the analysis can be excluded, such as "the," "our," and "from." Clouds can also be interactive, with hyperlinks to background on related terms and data. Some word cloud programs will link to numerical data on the absolute and relative frequencies of the word in the text and will provide the context for use of the word.

Seeing is Believing

Sometimes complicated information is difficult to understand and needs an illustration. In this Information Age, we are seeing the emergence of alternative means to visually communicate vast stores of information in newspapers, magazines, and reports. By organizing content into digestible pieces, main concepts or issues are easily discernible and can foster dynamic exchanges about timely subjects. For example, throughout the 2008 presidential election, several media sources reported information with word clouds.[2]

Visual thinking strategies have been studied as a means to enhance critical thinking, observation, and communication skills.[3] Technology can facilitate this form of learning by providing real world contexts that involve students in solving complex problems. Emerging digital resources allow users to capture data in unique ways, extend memory for events, and make thinking visible. These technology tools engage learners in the manipulation of resources and exploration of alternative strategies for expressing their own ideas.[4] Through the transformation of visualized collections and analysis of text, these tools are helpful in representing knowledge and facilitating communication.

Applications for the Social Studies Classroom

Back in the government class, the students are learning first-hand how to create a visual representation of President Obama's speech. They discovered that there are several open access tools on the web for generating word clouds from a sample of text. The students first explored numerous sites where they could access presidential speeches and other historical text.[5] Subsequently they experimented with Wordle.[6] Wordle is a web-based tool that facilitates rapid

analysis of text. The students were able to creatively organize the text cloud by manipulating the layout, fonts, and color schemes. With Wordle, they could print out their cloud or post them to the Wordle gallery to share with others online. Based on the analysis in Wordle, the highest frequency words used by Obama were: nation, new, people, every, America, less, today and common. The students thought that his language choice conveyed an inclusive tone, and prominently featured words that would convey a vision of participation in, and contribution to, American society. Conversely, they noted with surprise that the word "economy" was only mentioned three times.

The students also recognized the value of having several text clouds about a specific topic. One of the groups of students suggested analyzing the speeches of an entire administration to see if the staff reflected the zeitgeist conveyed by the president under which they served. IBM's data visualization service, Many Eyes, includes a feature that makes it easy to compare two separate text fragments in a single word cloud.[7] You can upload a text file containing two speeches with each text fragment preceded by a title that is sandwiched between at least five dashes like this: -----My fragment's title-----

Different color fonts distinguish between text from each fragment, and terms that occurred in both speeches are paired together. The site fosters an online social network of people who collectively contribute to charting and interpreting information in novel ways. Fernanda Viégas and Martin Wattenberg, creators of the site, have transformed data analysis into a collaborative activity. As Jon Udell notes in his *Interviews with Innovators* series: "The process is fun, and it also points toward a future in which our collective interpretation of the world is more firmly rooted in data."[8]

The students thought that this program could be used to compare Obama's inaugural address to other presidents' speeches. They found that George W. Bush's second inau-

A word cloud of President Obama's inauguration speech. Creative Commons www.wordle.net.

gural speech emphasized words like "freedom," "liberty," "country." Both presidents used "America" and "every" repeatedly. Conversely, in Abraham Lincoln's second inaugural address, war," "God," and "Union" were the most frequent terms.

The class also generated word clouds to compare Barack Obama's speech at the Democratic National Convention and John McCain's speech at the Republican National Convention. The resulting cloud provided an intriguing depiction of key themes and topics of the respective campaigns.

Subsequently, students discovered WordSift that enhances the word cloud with other functions to extend learning.[9] The program integrates features that highlight key vocabulary in the text and using Visual Thesaurus provides a graphical depiction of synonymous words and concepts. WordSift also displays Google searches of images and videos that are associated with selected words in the text.

Other resources accessed included the *New York Times* site Inaugural Words: 1789 to the Present, which presents interactive charts of the words included in each of the presidential inaugural addresses.[10] The students compared their analyses to blogger Chirag Mehta's word clouds, which track themes and trends in speeches, official documents, and letters written by American presidents between 1776-2008.[11]

Mehta's clouds also provide a historical comparison of the changes in word usage over time by brightening words that are prevalent in current presidential communication and fading terms that were more common in the past. These are fascinating resources to see how the executive branch's priorities have evolved over time.

Capital Words also was a popular site to view word clouds that capture key issues from the congressional record.[12] Word clouds are generated that visually depict national topics addressed in the Senate and House as well as state-specific word clouds. The information allows for state-to-state comparisons as well as a mechanism for tracking issues over time.

Conclusion

Word clouds have enhanced learning through increased participation in and

contribution to the civic discourse that is facilitated through online resources and social networks. However, they are limited, since the frequency of a word does not necessarily denote its importance in the text. Moreover, the context in which the word is used can often influence the intent of a statement, so students began using the word clouds as advance organizers that created an initial frame for more in-depth analysis.

Social studies educators need to be aware of this rapidly evolving technology and applications for our teaching and learning. Visualization is clearly an important benefit of these graphical depictions of language. They can transform text into powerful visuals that promote inquiry skills. Interactive visualizations help people see and exchange information in novel ways. By making use of these web-based tools within an inquiry-driven approach, students can expand their analytic capabilities and discover meaning by looking and thinking. ▨
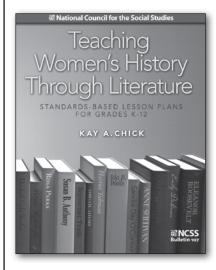
Notes

1. There were many social networking opportunities to facilitate young people's observation and participation in the presidential inauguration, ranging from a virtual inaugural ball in WeeWorld to young reporters' covering the event in Washington. See YPulse, www.ypulse.com/inauguration-coverage-how-tweens-teens-and-twentysomethings-will-watch/, for a collection of links and resources on this historic event, listed by age group.

2. Tag clouds visualize word frequencies in text. They have been used to capture trends in the usage of words in speeches and other historical documents. State of the Union speeches from presidents can be compared to see the relative importance of issues conveyed across time periods. Datasets of historical documents are available from The American Presidency Project www.presidency.ucsb.edu/sou.php, ThisNation.com, and Whitehouse.gov. The *Los Angeles Times* analyzed speeches presented at the Republican National Convention.

3. See www.vue.org.

4. M. Hannafin, S. Land, and K. Oliver, "Open Learning Environments: Foundations, Methods, and Models" in *Instructional Design Theories and Models: A New Paradigm of Instructional Theory*, vol. II, ed. C. M. Reigeluth (Mahwah, N.J.: Lawrence Erlbaum Associates, 1999), 115-140.

5. For collections of presidential speeches, see ThisNation.com, a repository of resources and historical documents related to American Government and Politics; WhiteHouse.Gov; The Avalon Project avalon.law.yale.edu/subject_menus/inaug.asp, a collection of digital documents relevant to the fields of law, history, economics, politics, diplomacy and government; The Scripps Library at The University of Virginia's Miller Center of Public Affairs millercenter.org/scripps/archive/speeches, which has collaborated with presidential libraries to organize a web-based collection of some important presidential speeches from the past 60 years and full text of selected presidential speeches from the eighteenth and nineteenth centuries; and PresidentialRhetoric. com, which links to information on the American presidents, political communication, and rhetorical criticism.

6. This web-based application is available at www.wordle.net.

7. See manyeyes.alphaworks.ibm.com/manyeyes.

8. See itc.conversationsnetwork.org/shows/detail3504.html.

9. See wordsift.com.

10. See www.nytimes.com/interactive/2009/01/17/washington/20090117_ADDRESSES.html.

11. See chir.ag/phernalia/preztags for word tags of historical documents from the U.S. presidency.

12. See capitolwords.org

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