Developing a Google Chrome Extension to Improve Online Readability

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The goal of our research was to replace complex words with synonyms at a user’s specified grade level.

Articulus offers both user settings and administrative settings, allowing administrators complete control over how students interact with the Articulus interface. Options allow for customization of the dashboard through automatic features and changing the reading level or locking the changing the reading level so that students can’t change it.

Dictionary Lookup
Select a word to open a dictionary definition of it.

Highlight
Select a portion of text to highlight.

Erase
Select a portion of highlighted text to erase.

Page Stats
Open a popup containing the readability metrics of the current webpage.

Help
A popup containing information about Articulus.

Purpose
- For students with learning disabilities, the task of reading online articles is often daunting, for two main reasons:
  1. Complexity of reading material
  2. Distractions created by online webpages, such as ads, images, and font colors and sizes.
- The goal of our research was to create a Google Chrome Extension that would increase the readability of online articles by:
  1. Removing distractions
  2. Replacing complex words with synonyms at a user's specified grade level.

Development Process
During the course of the summer, development tools like Pivotal Tracker and SourceTree were used to organize the team’s progress.

Since we were both working with JavaScript for the first time, we spent our first week of the summer learning JavaScript, jQuery, and how to build Google Chrome extensions. After that, we worked in two week sprints, with a release to our clients after every sprint.

Carnahan-Gelbaugh Metric
There are many readability metrics available, but the most common are the Flesch-Kincaid Grade Level and Coleman-Liau Index. However, these metrics weren’t always accurate for online articles, and in order to account for this inaccuracy, we derived the Carnahan-Gelbaugh metric. Given the variability of the Flesch-Kincaid metric, the Carnahan-Gelbaugh metric emphasizes the Coleman-Liau calculation greater than the Flesch-Kincaid Grade Level. We then take the average of these weighted scores and add a computed complexity score for the text.

\[ \frac{\text{Flesch-Kincaid Grade Level}}{2} - \frac{\text{Coleman-Liau Index}}{1.4} + \text{complexity score} \]

Complex words and sentences often affect readability, which is why the Carnahan-Gelbaugh also factors in a complexity score. A long word is defined as a word over 5 letters, a complex word is a word with more than 2 syllables, and a complex sentence is a sentence with more than 35 syllables and 60 letters.

\[ \text{long words} + \text{complex words} + \text{complex sentences} \]

Articulus
Freadom to (easily) read ‘em
Amber Lee Carnahan, Jori Gelbaugh, and Dr. Mike Jipping
Hope College Summer Research 2017

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Extension Features
- Declutter
Remove distracting images and videos from the current webpage.
- Increase Font Size
Increment the current font size of the webpage by one.
- Original Font Size
Return the font of the webpage to its original size.
- Decrease Font Size
Decrease the current font size of the webpage by one.

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Select a word to open a dictionary definition of it.

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User Lists
To fully customize Articulus, users can add their own synonyms for Articulus to replace. This gives them complete control over what words are replaced with what synonyms.

Similarly, users can specify words that they want Articulus to ignore, or never replace with a synonym. If a user forgets what words they've added, they can always view them from within the context menu. Additionally, if a user decides that they don’t want to use their lists, they can reset both lists at any time.

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