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Developing a Google Chrome Extension to Improve Online Readability

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Purpose

- For students with learning disabilities, the task of reading online articles is often daunting, for two main reasons:
 - Complexity of reading material
 - 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:
 - Removing distractions
 - Replacing complex words with synonyms at a user's specified grade level.

Reading Level Selection

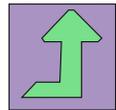


Select the reading level that Articulus will use to determine what to replace. Lower levels will adjust more than higher levels.



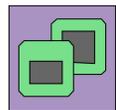
Articulus

Adjust the webpage using the set reading level.



Adjust a Passage

Highlight multiple passages to have only your selections altered, rather than the entire page.



Open Original Page

Open a popup of the original webpage, before changes.



Remove Ads

Remove ads from the current webpage.

Extension Features



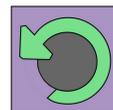
Declutter

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

Decrement the current font size of the webpage by one.



Dictionary Lookup

Select a word to open a dictionary definition of it.



Highlight

Select a portion of text to highlight yellow, green, blue, or pink.



Erase

Select a portion of highlighted text to erase.



Page Stats

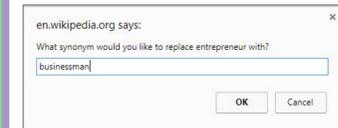
Open a popup containing the readability metrics of the current webpage.



Help

A popup containing information about Articulus.

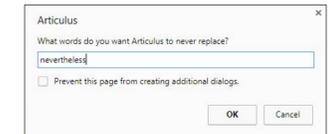
User Lists



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.



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.

$$\frac{(Flesch-Kincaid\ Grade\ Level * 0.6) + (Coleman-Liau\ Index * 1.4)}{2} + complexity\ score$$

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.

$$\frac{long\ words + complex\ words + complex\ sentences}{3}$$

Settings

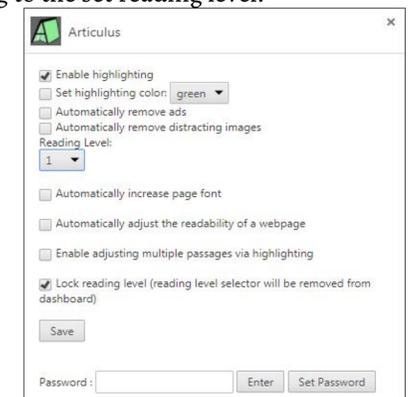
Articulus offers both user settings and administrative settings, allowing administrators complete control over how students interact with the Articulus interface. Options allow for customization of the dashboard through automatic features and changing the reading level or locking the reading level so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

Context Menu

There are several options within Articulus' context menu, which users can access by right-clicking on a page. These include adding or resetting user synonym and ignore lists, adjusting specific passages, defining words, and opening user settings. A context menu was included to further remove any obstacles that could make reading difficult for users.

Automatic Features

To make Articulus easier to use, users can select options to automatically apply specific options when the page is loaded. For example, checking "Automatically remove ads" will remove all ads, while selecting "Automatically remove distracting images" will hide all webpage images or videos. Additional automatic features include automatically increasing the page font and adjusting the page automatically, according to the set reading level.



Acknowledgements

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