

Browser Extensions for Post-Secondary Students with Disabilities

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Abstract

Our objective, in two investigations, was: (1) to provide a listing of safe browser extensions for Google Chrome that are likely to be useful for college students with disabilities, and (2) to provide the results of an empirical study of students with and without disabilities about which browser extensions they use, what they use these for, and why they do not use more browser extensions. Our findings indicate that there are many potentially useful browser extensions that could support students with and without disabilities to do academic work. But it appears that these are not used with any great enthusiasm for school work. Indeed, our findings show that the most popular uses of extensions are for shopping, adblocking, and entertainment. We provide a listing of safe extensions that can assist students with disabilities, speculate about why these are not used more extensively, and make recommendations for accessibility service providers and for the browser industry.

Keywords: browser extensions, post-secondary, college, university, students, disabilities, technology, google chrome, uses, concerns

1. Introduction

Browser extensions are “add-ons” that can be installed in Google Chrome, Microsoft Edge, Safari and Mozilla Firefox; these add new features to browser provide functionalities that all students can use. Extensions can change the browser experience by adding a function, such as altering background color, text size, changes to how to use the keyboard or mouse, and can remove ads and distractions. Browser extensions can also link to external services such as spelling and grammar checkers, productivity and organizational tools, text-to-speech and other reading tools.

Our main interest is in browser extensions that can assist college and university students, especially students with disabilities. This includes the close to 20% of Canadian and American post-secondary student population who have a disability such as attention deficit hyperactivity disorder or a mobility impairment (Canadian University Survey Consortium, 2020, 2021; Eagan et al., 2017; Fichten et al., 2018, 2019).

Browser extensions are important to study for a variety of reasons. First, most college and university students use their own personal technology as well as the institution’s computers, in libraries, computer labs and other areas where the ubiquitous Wi-Fi reaches. Second, much of the work students do requires using a web browser. Students, both with and without disabilities, are heavily dependent on using the web for research, communication, shopping, and entertainment. Therefore, web browsers need to provide increased functionality and customizability at the user side; browser extensions can do this (Pantelaio et al., 2020).

Because browser extensions offer a free or low-cost way to allow students with and without disabilities to support themselves, there is an increasing interest in extensions in the disability and post-secondary education community. For example, the most prestigious post-secondary education, disability and technology conference in North America, Accessing Higher Ground, hosted several talks on extensions at its recent conference (e.g., Stager et al., 2021; Arcuri et al., 2021).

Information about extensions is derived mainly from experts and vendors, rather than from the scientific literature or the

real-life experience of students with and without disabilities. For example, our literature search on Google Scholar, with some notable exceptions (e.g., Rao, 2021; Fitria, 2021) mainly provided articles that deal with the safety of browser extensions (Fass et al., 2021; Stojmenović et al., 2022), the privacy practices of web browser extensions, as well as about the development of new extensions intended for specific purposes. (Crichton et al., 2022; Eriksson et al., 2022; Barbosa et al., 2022). Although a regular Google search revealed many listings of potentially useful browser extensions for students both with and without disabilities, we were unable to find any studies that reported which extensions students actually used and whether they found these helpful. For example, there are many articles published for students with titles such as, “19 best Chrome browser extensions you need to have” (Banks, n.d.); “12 best Google Chrome extensions for 2022 [most popular list]” (Software Testing Help); “9 best Chrome extensions for college students in 2022” (Besas, 2021); “Some good Chrome extensions for students with learning disabilities” (Kharbach, 2018); “6 Google Chrome extensions for students with special needs” (Dystech, 2020); “11 great Chrome extensions” (Hall, 2021); “16 best Chrome extensions for productivity” (Kojic, 2022), and “The 26 best Chrome extensions for Chromebooks in 2021” (Orgera, 2021). In addition, the Chrome Web Store also has a curated collection for accessibility (Chrome Web Store, n.d.). But how many of such articles as these reflect idiosyncratic preferences of specific individuals and how many are frequently used, excellent and safe apps?

Google Chrome is the most commonly used browser in Canada (54% of market share); this is followed by Safari (29%), Edge (6%), Firefox (5%), and Opera (1%) (Liu, 2021). In addition, Campus Technology reports that Chromebook sales are increasing, and in 2021 were up by 69% (Nagel, 2021). Therefore, in this investigation we focused primarily on Google Chrome browser extensions.

1.1 Present Investigation

Our objective here, in two investigations, is to: (1) provide a listing of safe browser extensions for Google Chrome that are likely to be useful for college students with disabilities, and (2) provide the results of an empirical study of students with and without disabilities about which browser extensions they use, what they use these for, and why they do not use more browser extensions.

2. Study 1

The goal of Study 1 was to examine a large number of Chrome browser extensions purported to be useful for post-secondary students and evaluate them for safety and functionality with a specific focus on students with disabilities.

2.1 Procedure

A team of five Adaptech Research Network students with and without various disabilities compiled a list of 180 Chrome browser extensions that can be useful for doing academic work for college students with and without disabilities. These are based on a variety of online searches. As noted earlier, Google Scholar did not yield any information. However, regular Google Searches, blogs, informal articles, Facebook and LinkedIn groups, and the Chrome Web Store contained a plethora of recommendations.

Examination of the extensions went through a variety of stages. First, two team members read about them to ensure that they were safe (e.g., Wyman et al., n.d.). The following criteria were considered: Is this extension from a developer that is a trusted source? Is the developer's website consistent with the information on the extension page on the Chrome Web Store? Are the extension's permission requests consistent with the features of the extension? Does the extension's description or website explain why they need those permissions? Does the extension have a privacy policy, and is one comfortable with how the data are being used under the privacy policy?

All unsafe and possibly unsafe items were discarded. This left 100 extensions that were deemed safe. Then a team member evaluated the browser extensions by trying them out and examining how well the extension did what it was designed to do. The team's coordinator checked this to ensure the functionalities. Those that were unstable or did a poor job were discarded. This led to 68 browser extensions that were tested in detail by at least one team member and that were approved by the team's coordinator. Extensions that provided a unique function were retained. For extensions that carried out similar functions, the ones retained were based on evaluations of customer reviews in the Chrome Web Store. In addition, the team reviewed and selected a sampling of the most common and potentially useful extensions to test whether they worked with mainstream screen readers; this was done in collaboration with a legally blind team member who used a variety of screen readers.

2.2 Results

Sixty-eight browser extensions judged to be good or acceptable were retained. These were then grouped into 10 categories (Adaptech Research Network, n.d.). The following extensions were singled out by the team as especially useful for students with disabilities (Arcuri et al., 2022).

Table 1. Examples of excellent chrome browser extensions for students with disabilities

Browser extensions by function	
Comprehensive Literacy Tools	
•	Helperbird: most comprehensive with content, display, navigation, and other disability specific features
•	Read&Write: word prediction, highlight protection, summarize text
Reading – Common features include changing text size, color, spacing and background, text-to-speech, and removing distractions	
•	Clearly Reader
•	Helperbird
•	PrintFriendly & PDF
Writing – Common features include spelling and grammar checking	
•	Grammarly: most common and free
•	Microsoft Editor
•	QuillBot: summarizing and paraphrasing
Dictation – Speech-to-text:	
•	Voiceln: works in most textboxes including documents and Outlook
Screen Reader – Text-to-speech	
•	Clearly Reader
•	Kami
•	Read&Write
•	Speechify
Dictionary - Regular and picture dictionary:	
•	Dictionary Lookup
•	Read&Write
Word Prediction:	
•	Read&Write
Note-Taking - Common features include file management, notes, websites, saving screenshots, annotating on files (web, PDF, screenshots):	
•	Evernote Web Clipper: most comprehensive
•	Google Keep: simple but effective
•	OneNote Web: no annotations
Organizing Documents	
•	Evernote Web Clipper
•	Google Keep
•	OneNote Web Clipper
Simplified View	
•	Clearly Reader
•	PrintFriendly and PDF
Timers	
•	BlockSite: paid but offers series of timers
•	Marinara: simple and free
To Do Lists / Project Management Tools	
•	Google Keep: basic checkbox
•	Todoist
Website Blockers	
•	AdBlock
•	BlockSite: comprehensive but paid
•	Leech Blocker NG: limited options but free
Tab Management	
•	Dualless: mimics having two screens
Mice Alternatives - Controlling the browser without scrolling	
•	Caret (Google Partner)
•	Vimium: offers fully mouse-less experience
Mouse Gestures	
•	CRZMouse: effective but requires right clicking
Disability specific extensions	
Hearing – Managing volume, control and captions	
•	Otter.ai: caption
•	Ultimate Volume Booster
•	Volume Master: increases volume
Seeing - Changing display, magnification, text-to-speech (TTS), basic screen reading	
•	Beeline Reader: faint horizontal line helps with finding cursor and reading
•	Eye-Able@ - Accessibility Assistant: most comprehensive
•	Jaws Accessibility: theoretically accessible but practically inaccessible
•	TTS tool, keyboard navigation on menus
•	Zoom: similar to Chrome's zoom settings but more increments
Dyslexia - Changing font to make it easier to identify letters	
•	OpenDyslexic: works well for web reading, generally works well on Google web pages

It should also be noted that the team selected a sampling of the most common and potentially useful extensions to test if they worked with mainstream screen readers. The most common problem found was that the several extensions read the pop-ups, rather than reading what is displayed on the screen.

2.3 Discussion

The team recommended that students should use browser extensions if they are (a) hesitant to use assistive technology due to fear of stigma, (b) do not have assistive technology funding or training, (c) need minimal support, (d) have some tech experience, and (e) are not afraid to try and test options. It should be noted that (f) Some otherwise useful extensions were found to read the content of popups rather than the web page information. While the large number of tested and malware free categorized apps are useful, they do not reflect what students with and without disabilities are using or why they find specific browser extensions useful.

3. Study 2 Procedure

Here, our goal was to find out what works based on input from the students themselves. We wanted to know which browser extensions are potentially useful for post-secondary students with and without disabilities, what are the potential benefits of browser extensions for students and why students do not use browser extensions.

3.1 Sample

Twenty-one individuals participated. These were former and current post-secondary students who participated in our research between 2017 and 2022 and who had agreed to participate in future studies. At the time when they participated in this research 16 were still post-secondary students, three were no longer students and two did not indicate their status. Five participants had no disability and 16 had a disability. In rank order these are: mental health related disability, attention deficit hyperactivity disorder, autism, specific learning disorder, chronic health problem, low vision, mobility impairment, blindness, hard of hearing, and speech disorder. Several students had more than one disability.

3.2 Questions

1. If you use browser extensions, please let us know which one(s) you use and what you use each one for.
2. If you don't use any browser extensions, please let us know why you do not use them.

3.3 Method

The procedure was approved by the Dawson College Research Ethics Board. In an email sent to 338 individuals in July and in September of 2022 we defined browser extensions as "add-ons" that can be installed on Google Chrome, Microsoft Edge, Safari or Mozilla Firefox that add new features to the browser. We asked participants to respond to the two questions above by email and indicated that, as a token of our appreciation, we would enter their name in a draw to win a \$100 Amazon gift card.

The frequency of browser extension names was recorded. Using inductive and semantic coding, browser extensions were grouped into 10 categories in accordance with a coding manual created using the participants' responses (Vo et al., 2022). The 10 categories were based on the Adaptech Research Network's (n.d.) Technology Tool Categories. There were 40 codable responses made by the 18 participants who responded to Question 1. Two trained coders categorized browser extensions with an inter-rater reliability of 80%.

3.4 Results

In response to the question about which browser extension(s) the participant used, 28 different browser extensions were named. A minimum of 1 and a maximum of 7 extensions were mentioned by the participants.

Table 2. Browser extensions named by participants in alphabetical order

Name in alphabetical order	Number of participants who indicated this
AdBlock / AdBlock Plus	4
AdBlocker	1
Adobe Acrobat	1
Airtable Web Clipper	1
Antidote	3
Augmented Steam	1
Bitwarden	2
Cite This For Me	1
Dark Reader	1
F.B. Purity	1
Grammarly	5
Honey	10
Improve YouTube	1
Keepa	1
LastPass	1
Looper for YouTube	1
Momentum	1
Notifier for Gmail	1
Notion Web Clipper	1
Return YouTube Dislikes	1
Speechify	1
SponsorBlock	1
Swagbucks	1
Teleparty	2
uBlock / uBlock Origin	3
Volume Master	1
WAVE Evaluation Tool	1
Zotero	1

To examine what the extensions are used for, the 28 different browser extensions were grouped into 10 categories.

Table 3. Categories of browser extensions

Category in order of popularity	Extensions	Frequency
Shopping	Honey, Swagbucks, Augmented Steam, Keepa	9
Blocker	uBlock Origin, SponsorBlock, AdBlock, F.B. Purity Plus	6
Writing	Grammarly, Antidote	5
Entertainment/Media	Volume Master, Teleparty, Return YouTube Dislikes, Looper for YouTube, Improve YouTube	4
Password Manager	LastPass, Bitwarden	3
Productivity	Zotero, Notifier for Gmail, Notion Web Clipper, Airtable Web Clipper	3
Accessibility	Accessibility	2
Other	Miscellaneous	2
Reading	Adobe Acrobat	1
Reference/Translation	Cite This For Me	1

Note. Frequency refers to the number of times the category was specified.

If participants used few or no browser extensions we asked them why this was so (Question 2). Six participants indicated that they do not use browser extension or that they use only certain ones. They indicated that they do not know what extensions are, that they do not find them useful, that they don't trust them, don't know how to install or use them, and that they don't provide functionality they don't already have.

3.5 Discussion

The most frequently mentioned browser extensions used, in rank order, were Honey, Grammarly AdBlock / AdBlock Plus, uBlock / uBlock Origin, Antidote, Teleparty, and Bitwarden. The most common uses were for shopping, blocking ads, assistance with writing, entertainment, password management and productivity. As for why participants did not use browser extensions, the results indicate that that they do not know about them or cannot install or use them, do not find them useful, are concerned about malware, and believe that their needs are met with other apps and software.

4. General Discussion

4.1 Benefits of Browser Extensions for Students with Disabilities

Although seemingly not yet in common use, Study 1 shows that the potential academic benefits of browser extensions for students with disabilities is enormous. These offer a free or low-cost method for students to support themselves.

Extensions provide functionalities that all students can use but students with disabilities, second language learners and immigrant students truly need. Browser extensions can allow students to use these as assistive technologies without appearing to do so (i.e., thereby avoiding feeling stigmatized). Useful extension functions include, among many others: pop-up blocking (i.e., this has cognitive benefits and can ensure that students, especially those with attention deficit hyperactivity disorder, have fewer onscreen distractions), the ability to listen to web articles (e.g., useful for students who can benefit from having text read aloud, including students with visual impairments), formatting web page text to make it easier to read (e.g., for students who need to customize text format, such as students with certain specific learning disorders), and to automatically create website citations for term papers in the APA, MLA, Chicago, or Harvard referencing styles at the click of a button.

Students can add extensions to browsers that will provide features such as customized on-screen keyboards and specially configured mice, dictation tools (i.e., speech recognition which can assist students with limited use of their hands and other dexterity issues), dictionary and translation features (that can assist second language learners), screen magnification and alternate cursors (these can assist students with low vision), organization / productivity functions (these can assist all students, but especially those with attention deficit hyperactivity disorders), screen reading (text-to-speech), scanning and optical character recognition (these can render images into renderable text for students with print impairments), and extensions that help with literacy.

Though extensions offer a very diverse offering of functions and purposes, the large majority of the functions are related to staying focused, productivity grammar checkers, and text-to-speech. While there are some extensions that offer really unique features that will help people with other disabilities, those are rare and often not as developed. This means that not only will the user have less choice, but it is possible that the Chrome extension is not functional for their unique needs. While there are several extensions that can be used to help students with visual impairments, there does not appear to be a Chrome extension that adequately replaces a comprehensive screen reader such as Jaws or NVDA.

We should also note that exploring extensions in Study 1 we found extensions primarily for Chrome and relatively few extensions for Safari and Firefox. This was also the case for tablets, although Apple devices can use a limited number of browser extensions for Safari (Apple Store, n.d.). Similarly, while Chrome browser extensions are available for Android devices, as a Google search states, “Your Chrome extensions should install on Android, but there's no guarantee all of them will work” (Manyinsa, 2022). Browser extensions for smartphones are in their infancy.

4.2 Why Bother with Browser Extensions? Why not use Conventional Software and Apps?

Our Study 2 findings make it clear that browser extensions for students with and without disabilities are utilized mainly for uses other than for academics. Yet, as Study 1 shows, there are several excellent browser extensions that could assist students with disabilities to do academic work. This is true when students do not want to stand out as using software other than that used by their nondisabled peers, when cost of assistive technology is an issue, and when computers have storage limitations. Chromebooks, increasingly popular with the ubiquity of Wi-Fi, can easily make use of the large numbers of browser extension available for Google Chrome. So why don't more students use browser extensions?

4.3 What Are the Advantages and Disadvantages of Browser Extensions?

Advantages include low cost (Hope, 2021), no need for installation, discreet use, and interesting alternatives to assistive technologies. In addition, browser extensions have fast access and intuitive controls (Bellah, 2020). Extensions can be useful for Chromebooks and laptops that have limited drive space.

As Study 2 shows, however, there are also disadvantages. A key problem relates to privacy and security concerns. This is echoed in the literature (e.g., Bhadana & Panda, 2021), For example, some browser extensions that have malware can mimic legitimate extensions (see Orphanides, 2019; Bluvstein, 2022). Other disadvantages include not knowing which extensions are likely to be helpful, and not knowing how to install and use these.

4.4 Limitations and Future Directions

The key limitations revolve around the small sample size and poor response rate of Study 2. Future studies should include a larger number of participants and explore the academic impact of using various browser extensions. These should also examine students' negative experiences.

4.5 Implications and Practice Recommendations

It is imperative to note that browser extensions have important uses for students other than for academics, most notably for ad blocking and shopping. Our findings also clearly point to the conclusion that there are many excellent browser extensions that can assist students with disabilities. Disability service providers and access technologists may want to explore the safety and utility of various browser extensions that can assist students with different disabilities. Showing students how to install and use these would also be beneficial.

In addition, developers of browser extensions and the online stores that make them available need to screen extensions for malware. This is especially important for malware associated with automatic updates of the extensions. As noted by Orphanides (2019), a browser extension can be bought out by a malicious software creator. So it is vital that extension stores be vigilant, take consumers' complaints seriously, and implement a thorough ongoing testing program. Moreover, there is an important need for extension that can adequately replace a comprehensive screen reader such as Jaws or NVDA.

4.6. Conclusions

Browser extensions are at the nascent of use and development. Where they could be most useful (e.g., tablets and smartphones), they are, at this time, mainly unavailable. In addition, the reputation of browser extensions needs to be improved given the ongoing concerns related to malware. As noted by Orphanides (2019), it seems that Google has taken the lead by removing malicious extensions from the Chrome Web Store and disabling it on users' devices.

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