**Universal Access to Web Browsers**

### 1. Introduction

As per critical software for users with different access and learning needs, the web browser is most definitely one of the most important. Students now spend so much of their time online inside a browser. When they are on social media sites, chatting, searching, researching and collecting data, emailing, shopping, banking, reading the news, sports, entertainment sections, downloading music and watching videos online, or accessing school servers and Intranets, they often do all this using a preferred browser.

Equitable access to a secure, fast, efficient and useful browser is important. Having the necessary tools in order to see, read, comprehend, discriminate, appropriately and functionally use content is critical for students who have a disability.

Many different web browsers exist on computing systems and also on PDAs, Smartphones, tablets and other portable devices. The predominant choice being MS Internet Explorer for the MS Windows operating system as it is the default, or typical, browser that is included within this operating system. For MAC OS users, Safari is usually the preferred browser.

Many users do not install or use any other browser over and above the one packaged with their computer, as they are either satisfied with its performance or are unaware that they have choice. Often the default browser in a work place, school, training centre or institute of learning is determined by the IT department. This decision is made for a number of reasons, usually to do with maintaining the integrity of the system, experience, skills and knowledge of the staff or the policy of the IT department.

### 2. Background

Initially, the Internet and browsers were quite simply in design and execution with minimal graphical, video and sound content. Rich media takes time to download, be transferred and displayed on screen. Computers in the 1990s did not have high memory, high resolution or the capacities to handle large amounts of data.

A web browser is a software application for retrieving, presenting, and traversing information resources on the World Wide Web. An information resource is identified by a Uniform Resource Identifier (URL) and may be a web page, image, video, or other piece of content. Hyperlinks present in resources enable users easily to navigate their browsers to related resources. A web browser can also be defined as an application software or program designed to enable users to access, retrieve and view documents and other resources on the Internet. Although browsers are primarily intended to access the World Wide Web, they can also be used to access information provided by web servers in private networks or files in file systems.’ [Source: [http://en.wikipedia.org/wiki/Web\_browser ](http://en.wikipedia.org/wiki/Web_browser)]

### 3. History of Web Browsers

A variety of technologies helped form the foundation for the first web browser, WorldWideWeb, by Tim Berners-Lee in 1991. It was elementary but brought together a variety of existing and new software and hardware technologies. Then the NCSA Mosaic web browser was introduced in 1993. It offered graphical support and thus the popularity of the emerging web eventuated.

[Internet Explorer ](http://www.microsoft.com/downloads), [Mozilla Firefox ](http://www.mozilla.org/), [Google Chrome ](http://www.google.com/chrome), Safari, and Opera are the predominant browsers in the computing area.
Netscape released the Mosaic-influenced Netscape Navigator in 1994, which quickly became the world’s most popular browser, accounting for 90% of all web usage.

Microsoft launched its own browser, Internet Explorer in 1995. This caused a great deal of angst as Microsoft had cleverly bundled Internet Explorer with their Windows operating system. Every PC user had to have MS Windows installed in order to run their computers. Thus, Internet Explorer became the dominant web browser in 2002, clearly reflected in 95% of users.

Other browsers were later developed with Opera being launched in 1996, followed by an open sourced Mozilla Firefox in 1998, with Safari in 2003 and a new player Google Chrome, entering the market, in 2008.

A web browser delivers information, data and media resources to the user. This process begins when the user types in, links to, or copies and pastes a Uniform Resource Locator (URL) into the browser. The prefix of the URL determines how the URL will be interpreted. The most commonly used is http: and this identifies a resource to be retrieved over the Hypertext Transfer Protocol (HTTP). Many browsers also support a variety of other prefixes:

* WWW:          World Wide Web
* https:        HTTPS – Hypertext Transfer Protocol Secure (more for financial systems and used for secure transactions)
* ftp:          File Transfer Protocol – used to upload files and page content to web sites, Cloud services or data storage sites
* file:         for local files – files stored on a computer or server

In the case of http, https and local files, once all the data,- being text, graphics, sound, music, photographs, video and other content has been retrieved, the web browser will display it. HTML is passed to the browser’s layout engine to be transformed from markup to an interactive document.

HTML elements form the building blocks of all websites as it allows text, images and objects to be embedded. In addition, HTML can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links and quotes. It can also embed scripts in languages (e.g. JavaScript), that affect the behaviour of HTML webpages.



Web browsers can generally display any kind of content that can be part of a web page. Most browsers can display images, audio, video, and XML files, and often have plug-ins to support Flash applications and Java applets. Upon encountering a file of an unsupported type or a file that is set up to be downloaded rather than displayed, the browser prompts the user to save the file to disk.

Some browsers do not display anything but text. [Webbie ](http://www.webbie.org.uk/)is a dedicated browser for people with vision loss or impairment and especially designed for people who are blind who rely upon screen reading software (e.g. [JAWS ](http://www.freedomscientific.com/products/fs/jaws-product-page.asp), [Thunder ](http://www.screenreader.net/)or [NVDA ](http://www.nvda-project.org/)).

### 4. Media Players

A number of different players or software utilities are required to handle different media types. A selection of the most common are described so that users may understand their role in browsing rich media content.

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| **JAVA** | Java is an open source code that was created and designed with five primary goals. It should be simple, object-oriented and familiar, robust and secure, architecture-neutral and portable, execute with high performance and be interpreted, threaded, and dynamic. Java is a programming language and computing platform first released by Sun Microsystems in 1995. It is the underlying technology that powers state-of-the-art programs including utilities, games, and business applications. Java runs on more than 850 million personal computers worldwide, and on billions of devices worldwide, including mobile and TV devices. |
| **Adobe Flash** | Flash (formerly Macromedia Flash) is a multimedia platform used to add animation, video, and interactivity to web pages. Flash is frequently used for advertisements, games and flash animations for broadcast. Flash manipulates vector and raster graphics to provide animation of text, drawings, and still images. It supports bidirectional streaming of audio and video, and it can capture user input via mouse, keyboard, microphone, and camera. Flash supports automation via the Javascript Flash language. Flash content may be displayed on various computer systems and devices, using Adobe Flash Player, which is available free of charge for common web browsers, some mobile phones and a few other electronic devices. |
| **Adobe Shockwave** | A free player from Adobe that enables the browser to display 3D games and entertainment, interactive product demonstrations, and online learning applications. Shockwave Player displays Web content that has been created by Adobe Director.  |
| **Adobe Air** | The [Adobe® AIR This is an external link](http://www.adobe.com/products/air.html)runtime enables developers to deploy standalone applications built with HTML, JavaScript, ActionScript, Flex, Adobe Flash Professional, and Adobe Flash Builder across platforms and devices — including Android, BlackBerry, iOS devices, personal computers, and televisions. |
| **Windows Movie Player** | Windows Media Player V12 (WMP) is a media player and media library application developed by Microsoft that is used for playing audio, video and viewing images on personal computers running the Microsoft Windows operating system, as well as on Pocket PC and Windows Mobile-based devices. The player integrates web-browsing support to browse online music stores, shop for music and tune to internet radio stations since version 7. It provides an embedded capable ActiveX control for MS Internet Explorer so that developers can play Windows Media on web pages. |
| **QuickTime Player V7** | [QuickTime Player This is an external link](http://www.apple.com/quicktime/download/)is an extensible proprietary multimedia framework developed by Apple Inc., capable of handling various formats of digital video, picture, sound, panoramic images, and interactivity. The classic version of QuickTime is available for Windows XP/Vista/7 as well as Mac OS X Leopard. A more recent version, QuickTime X is currently available on Mac OS X Snow Leopard and Mac OS X Lion. |
| **QuickTime VR** | QuickTime VR (also known as QuickTime Virtual Reality or QTVR) is a type of image file format developed by Apple Inc. for QuickTime. It allows the creation and viewing of photographically-captured panoramas and the exploration of objects through images taken at multiple viewing angles. |



Other programs that can enhance the browsing experience include text to speech programs, such as [Orato ](http://fx-software.blogspot.com/2010/03/straight-forward-text-to-speech.html). It is a free floating toolbar that will voice any text that is highlighted or selected on a web page. [Natural Reader V10 ](http://www.naturalreaders.com/free_version.htm)also can be selected as a floating toolbar with [TextAloud ](http://www.nextup.com/TextAloud/)being an excellent low cost choice that embeds a toolbar in the browser. The commercial programs have high quality voices and extra functions and features over and above the free versions.

### 5. Plug -Ins, Add-ons and Extension

Many of the popular browsers off add-ons and extensions that provide additional support, tools, wigets and functionality to enhance the browsing experience or assist the user to locate, explore and access information and media content. Mozilla Firefox seems to have the greatest choice and breadth of content.

For example, the recently launched [**Google Related** ](http://www.google.com/related)by Google is a useful Chrome extension that, as the name suggests, lets users find related content when they are browsing the web. When users are surfing with Related, they will often see a thin bar along the bottom of their screen that offers videos, maps, reviews and other content that’s relevant to that page. When they see an item they would like to explore further, they can spread the word by using the built-in **+1** button.

One Firefox extension that I find invaluable is DownloadHelper as it is a free Firefox extension for downloading and converting videos from many sites with minimum effort. Using DownloadHelper, I can save videos from most of the popular video sites and it is also possible to capture all the images from a gallery in a single operation.

The official web site for Firefox extensions is [https://addons.mozilla.org/en-US/firefox/ ](https://addons.mozilla.org/en-US/firefox/). They are listed in 14 categories, with extensions and add-ons for every conceivable task. Some are definitely better than others. Some add-ons for people with disabilities are listed at [http://webaccess.tamu.edu/resources/browser.html ](http://webaccess.tamu.edu/resources/browser.html).

### 6. Toolbars

Often software companies will not only try to encourage (or trick) the user into changing the default web page to that of their preference (i.e. vendor’s company, developer, sales department web link) but also to add a toolbar that delivers traffic to their site or advertises services from which they contain revenue. This can be performed by simply clicking on an icon, photo or hyperlink. The user’s activity can also be tracked by use of cookies.

‘A cookie, also known as an HTTP cookie, web cookie, or browser cookie, is used for an origin website to send state information to a user’s browser and for the browser to return the state information to the origin site. The state information can be used for authentication, identification of a user session, user’s preferences, shopping cart contents, or anything else that can be accomplished through storing text data on the user’s computer.’ [ [http://en.wikipedia.org/wiki/HTTP\_cookie ](http://en.wikipedia.org/wiki/HTTP_cookie)]

Additional toolbars can be quite useful. I choose to mainly browse at home using Mozilla Firefox. One toolbar that I enjoy having displayed is [The Free Dictionary ](http://www.thefreedictionary.com/download.htm). It has quick links to the local weather, time, online radio station, links to news feeds, a calculator, translation engine and a dictionary and word definition tool and thesaurus. Another toolbar is [AddThis ](https://addons.mozilla.org/en-US/firefox/addon/addthis/)as it make sharing and bookmarking simple. It has icons with links to my favourite web 2.0 social networking, bookmarking, blogging, and e-mail services. [Adblock Plus ](http://adblockplus.org/en/)stops annoying ads from popping up and annoying me!

To help students or any users for that matter to access the web more easily, the [ATBar ](http://www.atbar.org/)is freely available. ATbar allows a user to change the look and feel of webpages, have text read aloud and spell check forms. It is a simple tool that will be made available for most popular browsers. Alternatively users can add the Lite version which works in any browser as it is simply a bookmark. As extensions vary from browsers to browser, it is a consistent set of tools offering text resizing, text-to-speech, font alteration, in-line dictionary and referencing. It needs to be downloaded and installed.

They do add functionality but increase the RAM memory requirements and may slow the performance of a user’s computing device, so having too many open at any one time could cause more problems than they are worth, especially on older, slower or less powerful devices (such as Netbooks).

### 7. Browser Functionality

Web browsers that enable students to work with data need to have features that allow them to easily access the required information that they require for study, research and data collection.

[ELR Software Pty Ltd ](http://elr.com.au/eiad/)in Gippsland Victoria developed [EIA Access browser](http://www.spectronicsinoz.com/product/eia-web-browser). It is specialized web browser, suitable for touch screen systems, with fully integrated Web awareness, assessment and training modules. The EIA System is designed for use in rehabilitation centres, libraries and public Internet access sites, disability support environments, private clinics and for specialised individual use. It can be purchased from Spectronics.



### 8. Software Choices

Predominantly, browser software is free and so users can choose from quite a large number of options. Some social web tools that cater to children can be membership or subscription based, but all of the main players in this software genre are provided at no cost to the user. There are some free browsers for mobile devices, Smartphones andtablets and then others being sold for quite reasonable amounts.

It all depends on the user’s preferences for either faster download times or the refresh speed, screen display or rendering, inbuilt services and functionality. If images, graphics, videos and music are not important or confuse and frustrate users there are ways to remove them.

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| Freeware and Subscription Based Browsers |
| **MS Internet Explorer V8** | [www.microsoft.com/downloads This is an external link](http://www.microsoft.com/downloads)– the default Windows browser  |
| **Mozilla Firefox V 8.0** | [http://www.mozilla.org/ This is an external link](http://www.mozilla.org/)Mozilla’s mission is to promote openness, innovation and opportunity on the web and offer a number of products, namely Firefox as a browser. It is a global non-profit organisation. They now offer a browser for phones as well. Has hundreds of plug-ins, add-ons and free additional resources |
| **Google Chrome** | [http://www.google.com/chrome This is an external link](http://www.google.com/chrome)– for Windows, Mac and Linux – mainly boasts speed and performance with a clean, uncluttered interface |
| **Safari**  | [http://www.apple.com/safari/ This is an external link](http://www.apple.com/safari/)For MAC and Windows – very intuitive, has multi windowed site reference with elegant look and feel and boasts having some powerful tools. Also now connects seamlessly to the iCloud. |
| **Opera** | [http://www.opera.com/ This is an external link](http://www.opera.com/)For Windows Mac and Linux – as well as Smartphones and tablets – mainly boasts having increased speed, add-ons and extensions Opera was designed to run on low-end computers with a strong commitment to computer accessibility for users who may have visual or mobility impairments. It has keyboard control over all main functions of the browser and the default keyboard shortcuts can be modified. Opera also supports the use of access keys to allow a computer user to immediately jump to a specific part of a web page via the keyboard. Opera was also one of the first browsers to support mouse gestures allowing patterns of mouse movements. |
| **Midori** | [http://www.twotoasts.de/index.php?/pages/midori\_summary.html This is an external link](http://www.twotoasts.de/index.php?/pages/midori_summary.html)– is a web browser that aims to be lightweight and fast. It also provides mouse gestures i.e. a pointing device gesture or mouse gesture is a way of combining pointing device movements and clicks which the software recognises as a specific command |
| Browser Apps |
| **Puffin Browser** | [http://www.puffinbrowser.com/ This is an external link](http://www.puffinbrowser.com/)– Puffin is very popular with iOS users as it can deliver Flash content on Smartphones and tablets, including the iPad.  |
| [**Opera Mini Web browser This is an external link**](http://t.dgm-au.com/c/31379/31316/1152?u=http%3A%2F%2Fitunes.apple.com%2Fus%2Fapp%2Fopera-mini-web-browser%2Fid363729560%3Fmt%3D8%26uo%3D4%26partnerId%3D1002) | Reputedly the fastest mobile web browser for the iPhone. Web pages are compressed to reduce data costs with data usage meter showing how much data users save. It also has support for predictive typing, including domain suggestions and auto-correct with instant bookmarking with a star in the URL |
| [**Atomic Web Browser This is an external link**](http://t.dgm-au.com/c/31379/31316/1152?u=http%3A%2F%2Fitunes.apple.com%2Fus%2Fapp%2Fatomic-web-browser-browse%2Fid347929410%3Fmt%3D8%26uo%3D4%26partnerId%3D1002) | Atomic Web Browser is an advanced and customisable full screen web browser. Users can experience desktop features including Adblock, Tabs, MultiTouch Gestures, User Agent Switcher, Passcode Lock, Facebook/Twitter integration, Save Page, Downloads. Enables tabbed browsing, private mode and a handy orientation lock while browsing. Costs $0.99 |
| **Firefox – Android**  | [https://market.android.com/details?id=org.mozilla.firefox This is an external link](https://market.android.com/details?id=org.mozilla.firefox)Firefox features browser sync, add-ons, tabs, personas, built-in sharing, location-aware browsing, one-touch bookmarks, it also learns a user’s typing habits with multi-search engine integration and full-screen view. In addition it renders pages extremely well. |
| **Dolphin Browser – Android** | [https://market.android.com/details?id=mobi.mgeek.TunnyBrowser&hl=en This is an external link](https://market.android.com/details?id=mobi.mgeek.TunnyBrowser&hl=en)Dolphin’s features include add-ons, gestures, webzine, multi-touch pinch zoom, tabbed browsing, sidebar, speed dial, smart address bar, bookmark folder, user agent, themes, and multi-language support. |
| Browsers to Meet Specific Needs |
| **WebbIE**  | [http://www.webbie.org.uk/ This is an external link](http://www.webbie.org.uk/)WebbIE is a web browser for blind and visually-impaired people, especially those using screen readers, used since 2001 all over the world. It comes with the accessible programs, letting users access news and audio on the Internet in a simple and accessible way, allowing them to use podcasts, listen to the radio and read RSS and news with a screen reader (e.g. Jaws, Thunder or NVDA) or other access solution. |
| **Zac Browsers**  | [http://www.zacbrowser.com/ This is an external link](http://www.zacbrowser.com/)– Zac Browser is a totally free software package. It is the first Internet browser developed specifically for children living with variants of autism spectrum disorders |
| **Kidzui**  | [http://www.kidzui.com/ This is an external link](http://www.kidzui.com/)A safe environment for younger students |
| **The Tweens Browser**  | [http://www.tweensbrowser.com/ This is an external link](http://www.tweensbrowser.com/)– caters to children ages 7-12 and is also suitable for people with autism & other developmental disabilities |
| **Buddy Browser**  | [http://www.buddybrowser.com/Buddy-Browser-Selection.cfm This is an external link](http://www.buddybrowser.com/Buddy-Browser-Selection.cfm)Buddy Browser is a tool designed for children. It boasts having internet safety filters, with a lack of chat rooms and disabling of web surfing but Buddy Browser has its own Safe Buddy Messenger created specifically for its young users. |
| **Glubble**  | [http://glubble\_for\_families.en.softonic.com/ This is an external link](http://glubble_for_families.en.softonic.com/)transforms the Mozilla Firefox browser into a family-friendly environment with a focus on sharing media and interacting with others. It is designed essentially for family use, as Glubble features a family homepage, and various ways in which to securely share media amongst family members.  |
| **Kido’z**  | [http://kidoz.net/ This is an external link](http://kidoz.net/)This is another safe site for young children – at a subscription cost though. |
| **Girl Sense** | [http://www.girlsense.com/premium/ This is an external link](http://www.girlsense.com/premium/)Targets girls with appropriate activities, links and news |
| **Club Penguin**  | [http://www.clubpenguin.com/ This is an external link](http://www.clubpenguin.com/)High quality Disney site offering a range of safe options. Note that membership fees apply |
| **Webkinz**  | [http://www.webkinz.com/ This is an external link](http://www.webkinz.com/)– Webkinz is a delightful environment for very young children. It is primarily a social network offering animal-theme avatars from which to choose and even more interactive options for onsite participation. Games, trading cards, news and craft ideas are some of the features found on Webkinz |
| **Moshi Monsters** | [http://www.moshimonsters.com/home This is an external link](http://www.moshimonsters.com/home)– this is an avatar based resource with children ‘adopting’ a monster. Ideal for young students or those with special needs |
| **myYearbook** | [http://www.myyearbook.com/ This is an external link](http://www.myyearbook.com/)myYearbook is a social network was created by teens, for teens. It is now linked to Facebook. It was co-founded in 2005 and is a place to meet friends. |

### 9. Universal Access for Users

Efforts have been made by different companies and organisations to provide tailored solutions to individuals who have different access needs. Dedicated browsers, toolbars and add-ons have been created so that the content is accessible. Sites should be able to be navigated b y a pointing device and more critically for some users by keyboard equivalents. Others require text only for screen reading with other users needing just text to speech options, magnification systems, screen tinting or removal of video, graphics or ads.

‘Since a web page can be interpreted differently by different browsers with different capabilities, and since the language of a web page- HTML, is constantly evolving, accessibility must be considered to make a page usable by as many people as possible. The keys to making your page accessible are graceful degradation, standards compliance, fast loading, and intelligent organization.’ [Source: [http://www.anybrowser.org/campaign/abdesign.html#accessibility ](http://www.anybrowser.org/campaign/abdesign.html#accessibility)]

Judicious use of search engines can also cater to different needs. Google is the most commonly used search engine, with Yahoo, Bing, Ask, MSN and may others competing for user loyalty. A good guide and list of engines can be located [http://www.philb.com/whichengine.htm ](http://www.philb.com/whichengine.htm)where purpose and outcomes are matched. Visual search engines accommodate other users with [Cooliris ](http://www.cooliris.com/)being a stunning visual plugin for locating and viewing graphics and photos. A wonderful resource is [Spezify ](http://www.spezify.com/)with the rich graphical and visual aspect in conducting research appealing to many children with ASD.

### 10. In Conclusion

This article briefly describes why some web browsers offer greater flexibility and functionality over others. Some were created and designed for specific purposes, whether it be greater efficiency and speed or to cater to a niche market.

In many instances, for individual use, it is a matter of preference. In others, it is a regime imposed at school, University, TAFE training institute, library or work place as the browser choice has been made by the IT department. There are browsers that can be run from memory drives as portable apps (e.g. Firefox as in Access Apps – [www.eduapps.org ](http://www.eduapps.org)) and ones now specifically designed so that they can run Flash content on iOS devices such as iPads and Android tablets – e.g. [Puffin ](http://www.puffinbrowser.com/)browser.

The issues of specific browsers on iPads and other digital tablets will be interesting to watch. With Smartphones and portable devices becoming the preferred way to access the web whilst people are on the move, the need for fast and efficient browsers will only force developers to create software that is compact, quick and flexible. This also means that equitable access will need to be carefully considered