Pimp My Browser[1]: Browser Plug-ins Enhance Undergraduate Research

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Abstract - Undergraduate research should be built upon the literature search. Today, an undergraduate can search an online index to find articles, write the paper on a word processor, perhaps organize the articles with citation software, and finally, use translation software to get a rough sense of a foreign language article. Now consider using browser plug-ins to manage all these tasks. Students can now customize the browser to serve their needs. Open Source software allows this.

Keywords: browser, extensions, add-ons, customization

INTRODUCTION

The web browser is the primary means by which the user interacts with the Web, but for all its ubiquity, customizing the web browser is a topic that is largely ignored beyond the computer science literature. There, computer scientists write on how to customize browsers, but their articles tend to run toward how to code new features, which is an important skill, but one that few browser users will ever master.[2]

On the other hand, library literature has focused on the database, in keeping with the library tradition of honing one's database searching skills on the standard tools of the computer world: hardware, software, and the network.

The Open Source world has devised a wonderful enabling technology for browser customization named Firefox, which allows customization through what it calls add-ons (also called extensions). Mozilla was originally formed from the ruins of Netscape, a pioneering browser that was seen off by Internet Explorer. Before it died, Netscape relicensed the product as Open Source. It became the Mozilla Project and Firefox was the browser. The bare-bones nature of the original Firefox led to a virtuous circle where the released browser became popular, the developers took advantage of the easily installable add-ons to create more add-ons and features, and the popularity of the add-ons lead to more people being interested in developing them. Today, add-ons are one of the features that lead people to choose Firefox over competing browsers.

Why Would Students Use Add-ons?

The advantages of Open Source add-ons for students include low cost, freedom, flexibility and a chance to experiment.

While developers have charged for Open Source software, the nature of the Open Source license, in all its varieties, include mandating the sharing of software and any improvements. This means most charges associated with Open Source consist of technical support packages for large entities such as companies that use Open Source.

Freedom—to modify and to share--was the concern of Richard Stallman the founder of the GNU Software Foundation and an unceasing evangelist for Free Software. This philosophy is in contrast to proprietary licenses that usually restrict what the user can do with the software. Here is some standard boilerplate language from the Microsoft Vista license, "SCOPE OF LICENSE. The software is licensed, not sold. This agreement only gives you some rights to use the software. Microsoft reserves all other rights."[3] The essence of the GNU General Public License is described in the Basic Permissions section where it states: "This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law."[4] Legally, Free Software Licenses and Open Source Licenses are not identical and the user of Open Source software should be aware of the differences.[5]

Flexibility is related to freedom, as the freedom to use your preferred software for any application. The VLC media player[6] can substitute for almost any other media player and is Open Sourced. In fact, Firefox is not the only software sponsored by the Mozilla Foundation; they also make the Thunderbird email reader. This flexibility means

that instead of just taking software from one company as a package deal and bearing down and learning to live with what you get, warts and all, customers have the flexibility to choose the software that fits them best. If one thinks that it is no big deal to just accept whatever one gets in a software package, one has never had to edit a webpage composed in Microsoft FrontPage and one might wonder why the software inserted all those ugly ampersands into the HTML code. Another advantage of Open Source software is since anyone can contribute to it, the code must be standards compliant.

Finally, the chance to experiment is critical to learning software. For this reason the barriers to software adoption like cost, licensing, and a vendor tie-in, should be either removed or minimized. Open Source software is usually available without charge, but even when there are charges the costs are minimal compared to proprietary software. Licensing is a thicket that is usually best left to lawyers, but, speaking from my own experience, the freer the license the better. I have had vendors demand licensing terms such as, one download only for a CD, or Digital Rights Management (DRM) for all downloads, or only one article download. More standard restrictions vendors ask for include no Inter-library loan of downloads, or no delivery of articles from the database to branch campuses. These licensing restrictions have the effect that even if the database is purchased despite the restrictions, there is little incentive to learn the database when there are similar databases that may be taught, used, and experimented with, with fewer and more reasonable restrictions.

With freedom from restrictions, the user can experiment and learn the software more deeply. This freedom allows users to check a database against different browsers to see which one is more responsive. If there is a problem with one browser, this freedom allows one to check for an add-on that might solve the problem. A customizable browser can rapidly go from a curiosity the student is aware of, to an essential tool the student cannot do without.

Generic Add-ons for research

Two environments that are leading the way to a customizable browser are Greasemonkey and LibX, an implementation of Greasemonkey. The idea behind Greasemonkey is that extra functionality can be added to web pages by modifying the browser. Among other options there is an ACM paper listing the useful changes Greasemonkey could add to a page such as automatic translation.[7] The computer science literature in particular makes a great deal out of browser add-ons that enforce security in a web browser; this paper argues that the most valuable plug-ins are those that ordinary undergraduates with no skill in programming can put into their own browsers to enhance their research. In this area LibX[8] is king.

LibX can be thought of as a library catalog with an “instant on” feature. [9] The user no longer has to keep the library catalog (or other catalogs) on a bookmark list and then <click> on Bookmarks then <click> on the library catalog and enter the search. The user simply enters the search at the top of the browser and the search is done. LibX also comes with a feature for searching Google Scholar (with highlight and click and drag highlighted text to the “Scholar” button.) After that LibX features are only limited by the inclination of the library programmers who administer their library’s LibX implementation. At Auburn University Libraries this LibX toolbar is called AU Libraries Anywhere and includes links for searching the library catalog along with keyword only searching other libraries in the Network of Alabama Academic Libraries, the Auburn Public Library, Amazon.com and WorldCat. Also, LibX automatically inserts hyperlinks to ISSN & ISBN & DOI numbers and those links can go to any database or the local library catalog.

This list of features is informed by experience. Our reference librarians are frequently asked to find popular fiction and the LibX toolbar makes shifting from Auburn University Library to the Auburn Public Library catalog easy. In sum, LibX speeds up information retrieval and increases user satisfaction with library services. Also, our toolbar has a link to our ILL online order form, a link to our online reference chat service, a link to renew books, and a link to the full-text of journals online. The most difficult part of using LibX is remembering that it is there.

Add-ons Beyond the Usual

While LibX has many useful features, there is a need for added customization beyond what a library systems department can provide. "Pimping" a browser is a personal choice, and an appropriate choice for one undergraduate may not necessarily be an appropriate choice for a whole college campus. Mozilla browsers come with a search window, usually in the upper right-hand corner of the browser. There are at least two ways to add search engines to that browser window. Mozilla.org has a list of installable add-ons to the search window which the user can find if he clicks on the logo (usually displaying Google's G icon) and on the popup window, scrolling down and clicking on the line "Manage Search Engines." The link takes you to the Mozilla add-on page where the most popular search engines are listed for the user to include in his browsers search window, but sometimes that list is too limiting for the power user. The add-on I use for those cases is called Add to Search Bar and is also listed at the Mozilla Add-on page. After Add to Search Bar is installed, one right-click on any search window on a page will add it to a Firefox browser. I have added a variety of government science and technology literature indexes this way.

One service most libraries have never provided is a translations service. This is not because such a service is not desirable, but because demand for the service is too infrequent and the skills and time required to provide a high quality translation are in short supply. I use the Google Translate to English button and put it on the browser toolbar to keep that capability close at hand. To see an example of this service in action, try a search of http://news.google.fr/ for Airbus A380 for a demonstration of the usefulness of this feature. The translate button works best when the web page being translated uses standard, non-colloquial, and non-technical language. Otherwise the translations become unreadable. Even so, machine language translations tend toward the ridiculous.

Zotero[10] is a valuable browser add-on developed at George Mason University that provides researchers much of the functionality of citation management software in a browser plug-in. Like other Firefox add-ons it is Open Source software and allows researchers to both save citations from online databases and the full-text of the articles. On the publication and production end, it allows researchers to insert references into Word documents and to publish bibliographies afterwards. This paper's creation was aided by Zotero. Zotero enables automatic saving of citations from standard online indexes, and if the online index is non-standard, or a web page needed for reference, one may also type in a Zotero entry. Typing in a Zotero entry is as simple as filling in the blanks for standard citation fields such as Title, Author, and Abstract, along with other fields.

Why Add-ons Are Important for Undergraduates

Undergraduates are the perfect audience for browser customization. Undergraduates are energetic and eager to learn about new things. While some undergraduates have more enthusiasm for technology than others, most are early adopters of technology compared to their parents or instructors. At the same time, it is clear that the art of research is generally new to the average undergraduate. He or she needs instruction in research strategies and needs opportunities to practice these new skills. In addition, cost often determines the technology that college students can adopt and the types of software that they can purchase.

Open Source software browser add-ons offer a way to maximize a student's effectiveness as a researcher. One of the most dreaded things I can see at the reference desk is a handwritten citation to an article, jotted on a torn piece of paper. Invariably the student found a reference, thought that the reference was interesting and appropriate to his or her research topic, scribbled it down and went to the library to find it, and then—when he or she didn't find it and all other options were exhausted—came to the reference desk for help. Most librarians know from experience that a handwritten citation is often inaccurate or incomplete. Common errors include misspelled author names, confusion about journal abbreviations, and failure to note journal volume and issue number. All these problems and others make for a difficult reference search.

Consider how different it would be if the browser contained citation management software. With a few keystrokes, the student could search for a topic, save the results, and then if the full-text of the article was not available online, the student could print the citation out and find the article in the library.

Another challenge is simply finding information. With experience, every researcher develops a few carefully bookmarked sites that are the first stops in his or her research. What about the novice researcher? Even experienced researchers have difficulty searching for information outside of their usual databases. A polymer engineering graduate student came to me recently because her usual polymer engineering databases did not have any information on medical device packaging. When I found all the information that she needed in a medical index she was amazed.

This is where a library interface on a toolbar or a more general search site in the search window can be helpful. When more options are more easily available for searching, everyone, not only undergraduates, will use them for their research. As I mentioned earlier, website design is hard to get right, and impossible to get right for everyone; hence the need for a customizable browser. More databases, more easily searchable from a consistent toolbar encourage more searches and hence more comprehensive searching.

Experience has taught me that if we just use the customizable browser to do what we have always done before in libraries or for our research, we will miss real opportunities to expand the breadth and quality of undergraduate research. The best example I have of this is the rapid improvement of machine translations of web pages. While there were previously legitimate reason to ignore machine translations as being good for little more than a source of amusement, current translation software can provide usable, if rough and ready translations and could in the future improve to be better than any human translator, at least in terms of quality of the text against the speed of the translation.

Undergraduates should also be instructed in how to use browser add-ons to enhance research. Currently, the best method seems to be to adapt present library instruction schemes, but that could change as instructors find out which teaching methods for browser customization work best. Presently, librarians tend to either "teach the database" or "teach research methodology." Teaching the database (or teaching the research tool) is tending to go out of favor as instructors learn that students can typically teach themselves the mechanics of database use. The real instructional need is teaching research methodology which would included identifying keywords to search, selecting the appropriate index, and providing proper citations to all referenced articles.

If teaching research methodology is the key concern, one way it can be taught is through active learning, where the students select a topic relevant to their work and then the students are guided through a Socratic dialogue about their research. Questions the instructor can pose for the students include, "What is your topic?" What are the main concepts or keyword for your topic? What are synonyms for your keyword that will let you broaden your search?

Undergraduates in this age of Google have fewer problems finding keywords, than previous generations, due to Google making sloppily constructed searches more effective than ever. Experience shows that undergraduates have some bad research habits that must be unlearned before they become effective researchers. Probably the worst habit is cherry-picking articles that support the conclusion that they maintained before they did their research! Experienced researchers know that Google can aid this bad habit simply by skewing the choice of keywords. The keywords Safe Efficient Nuclear Power returns 988,000 results in Google, and all the results found on the first page of results are favorable to nuclear energy. The keywords Dangerous Inefficient Nuclear Power returns 125,000 results and the results on the first page are uniformly negative. While this could happen in any database, if undergraduates were taught how customizing a browser makes it easy to search a diverse host of databases, the chances for cherry-picking would be reduced.

Undergraduate researchers have is a tendency to prefer the trivial article in full-text online, and ignore the superior article that is only available in print. While this problem is being attenuated as more and more scholarly publishers go online, there is still much literature in the archives that is valuable, but may never go online. Also, due to licensing restrictions, not all database vendors have articles available online that other database vendors might have. In this case, being able to use the customized browser to rapidly search several databases in succession could help with this problem.

A final problem undergraduates have that a customized browser might alleviate is plagiarism. While the causes of plagiarism are many, one is simple ignorance of how to give a proper citation.[11] Research is hard work which requires time, understanding of the question, organization of information, and perhaps a citation manual at the elbow, in order to perform excellent research. Many librarians attended college where the proper research methodology's enabling technology was a rubber-banded stack of 4" X 6" recipe cards where citations and quotes needed in research were written down. Anything that would simplify and automate this process would be appreciated by the student and the instructor.

The browser lies at the core of online searching and up to now it has not fully been appreciated what it can do for the craft of research. Undergraduates today are lucky to be able to participate in a revolution in research that has been permitted by the customized browser.

Follow Up Research Needed

Browser customization needs more study, both to enhance the teaching of it to undergraduates, and to identify the needs of researchers that could be satisfied by new add-ons, and to help developers of add-ons enhance their product.

Studies needed of current Add-ons include:

1. Does browser customization enhance research?
2. What prevents students from customizing their browser?
3. What is the most effective way of teaching browser customization?
4. What do students think of browser customization
5. What do instructors and librarians think of browser customization?

Studies needed of undergraduate researchers include:

1. What do undergraduates want to be able to do the browser to enhance research?
2. How can browser customization be made simple?
3. Where do undergraduates want to save research? On their own computer? On the web?
4. What other add-ins would add research functionality to browsers?
5. What do undergraduates dislike the most about research?

Conclusion

In many ways traditional library considerations of teaching online research to undergraduates misses the point of modern research capabilities. The point is not Boolean vs. natural language searching, or user-interface studies of web pages, because the undergraduate researcher makes his own adjustments to those hurdles, but rather, why shouldn't the undergraduate adjust his browser to suit him or herself?

Many things have been assumed in the past about the needs of undergraduate researchers that date from the days of the big green Readers' Guide to Periodical Literature, or from the days when students went to the Reference Desk for reference assistance. The former example is from a time when all research was done with print resources, the later when the Reference Librarian acted as gatekeeper, and neither is as true today.

Today undergraduates can find music online on their own, and save Television programs on TiVo on their own so why should they not be encouraged to automate as much of the search process as possible?

While these examples are drawn from the Firefox browser, these principles should be recognized as being generic to all browsers and all researchers. If a browser does not support this capability of customization, it should.

Biographical Information

Andrew Wohrley is an ASEE ELD member and the Engineering Librarian at Auburn University.

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