How ARL Academic Libraries Present Open Web Resources: A Proposed Solution to Address Discoverability

ABSTRACT

Open web resources on the Internet have become increasingly important in the scholarly community and are being cited ever more frequently in scholarly articles. Academic librarians continue to assess and collect open web resources that are of value to the academic community in order to support research. With the questions of how ARL academic libraries collect, present, and make searchable open web resources, this paper analyzes all ARL academic libraries' websites and finds that all of them are collecting valuable open web resources and presenting these on research/subject guides. This paper also finds some ARL academic libraries implement search boxes for the collected list of open web resources, but only descriptions or titles of the resources housed on the libraries' website are being searched. None of the libraries make the content or full text of open web resources discoverable on the academic library websites. Based on the findings, this paper proposes a solution to address the discoverability issue of collecting open web resources and how to make the content or full text of the open web resources searchable.

KEYWORDS: Open Web Resources, Online Resources, Discoverability, Discoverability of Open Web Resources, Academic Libraries, Research Guides, Subject Guides

INTRODUCTION

Librarians assess and collect resources that are of value to students and faculty in order to support research. One type of items collected are open web resources, which are subject specific websites freely accessible by anyone with access to the Internet including government, organizational, nonprofit websites, in addition to individual open access journal articles that are stored on research/subject guides. In the last two decades, open web resources on the Internet containing valuable information have been influencing the academic community and have been increasingly referenced in scholarly publications. Academic library users have adopted a new pattern of information searching and have been calling for effective searching features. Online search engines have influenced library patron's expectations for ease of accessible valuable information. Discoverability issues of academic-valuable open web resources remained unsolved according to the current literature.

This paper observes how Association of Research Libraries (ARL) academic libraries collect and present the valuable open web resources as of spring 2014. The observation finds that ARL academic libraries gather links to open web resources, but several do not have a way to make these resources discoverable on the library website. Meaning there is not a way for patrons to search for the collected links and none of the libraries is set up to search the content or fulltext of the open web resources. Databases usually mine several fields of data for search results, but because these open web resources are only linked to research/subject guides at the academic libraries the content is not searchable. At best, the content of the description of the open web resource written by the librarian is searchable, but it is usually only the title. To make these resources useful libraries need to make the full text of the resource searchable on library websites. Based on the findings, this paper proposes a solution to address the discoverability issue of collected open web resources and how to make the content of the open web resources searchable.

LITERATURE REVIEW

The Internet has become part of the everyday experience for many people worldwide. With the exponential growth of online resources becoming available in this new era, information from the Internet has integrated into academic-related resources, playing an important role in scholarly publications (Yang, Qiu, & Xiong, 2010). Spinellis (2003) noticed that researchers had been using a substantial amount of web resources in their scholarly publications. In one of Reed and Tanner's (2001) studies, they asked academics to rank information resources from the web. For general topics, 50 percent considered the web valuable, and 41.8 percent considered the web valuable for scholarly purposes (Reed & Tanner, 2001). Gray, Thompson, Clerehan, Sheard, and Hamilton (2008) and Wu (2009) also noticed that the Internet had become an enormous academic document repository, functioning as an important platform for people participating in

academic research to obtain valuable information. As stated by Yang and Chou (2009), one of the most obvious indicators of the web's acceptance and value to academia was the substantial citation of website URLs in peer-reviewed publication across all disciplines.

In a study of web resources in scholarly journals, L. Zhang (2011) found that from 1996 to 2007, the percentage of web resources being cited in peer-reviewed publications was in a steady growth. In a similar study conducted by Y. Zhang (2001), the percentage of articles containing e-citations increased from 1.8 to 33.9 percent between 1991 and 1998. This study defined e-citations as anything online, which included electronic journals as well as open web resources (Y. Zhang, 2001). In 2002, Herring studied the citations across disciplines and found that more than 55 percent of articles cited electronic references, which contributed to 16 percent of total citations. In 2008, Bhat and Kumar's study showed that for all 25,730 references, 81.49 percent of articles had web references, and 43.52 percent of all references were open web resources. In 2010, a survey conducted by Naude, Rensleigh, and Du Toit showed clearly that respondents had accepted open web resources as valuable information for academic purposes, and up to 90.2 percent of respondents had used open web resources for academic and research purposes. L. Zhang claimed in 2011 that online resources had gained a wider recognition among researchers (p.168).

In recognizing the importance of open web sources, scholars have been studying information-seeking behaviors in higher education and have identified a library patron need to have open web resources integrated into a single discovery service. Saad and Zainab (2004) reported that undergraduate students depend on online search engines such as Google to search for information for research purposes. The study claimed that Internet usage at the early stage of research is important to familiarize students with their topics (Saad & Zainab, 2004).

After finding out a similar conclusion that novice researchers, including college freshmen and seniors, chose generic search engines as the highest rated channel for information searching, scholars stressed that libraries need to develop a new approach to assist researchers on academic valuable information (Ismail & Kareem, 2011; Pickard & Logan, 2013). Facilitating research requires the libraries to understand the particular information seeking behaviors of library patrons better (Pickard & Logan, p.402). Kirkwood (2008) and Haines, Light, and O'Malley (2010) also stated that librarians and educators need to enhance information literacy by providing valuable information resources to researchers, calling on librarians to revise their information-collecting policies and to integrate resources and services to facilitate research.

Rare is the literature discussing open web resources collections and how to make them searchable in academic libraries. Morris and Grimes (2000) believed that librarians have continued to develop research/subject guides even as "the advent of the Internet and its myriad sources of information has changed how librarians create and maintain these guides" (p.213). In the recent studies scholars found out that the most significant ways that academic libraries have been presenting a collection of scholarly-valuable links is through research/subject guides, either via LibGuides software or in self-developed web

pages (Ghaphery & White, 2012; Hill & Bossaller, 2013). However, although libraries have been increasingly gathering links of open web resources on research/subject guides, these guides have not seen the same increase in usage due to the lack of promotion (Tchangalova & Feigley, 2008). To improve the visibility of the guides, Vileno (2007) suggested that the main page of the library website as the "starting point would seem to be the most obvious place to promote subject guides" (p.444).

Patron groups had perceived values in research guides, but patrons were calling for more compelling and effective search features, allowing patrons to search all relevant online resources through a unified interface (Horn, Adams, Cook, Heidig, & Miller, 2009; Ghaphery & White, 2012; Hill & Bossaler, 2013). In a recent study, Lown, Sierra, and Boyer (2013) believed that the generic search engine had shaped user expectations for ease of information searching, and a federated single search box had successfully gained popularity among library patrons.

Although libraries have embraced discovery systems, these systems are still not able to include all resources the libraries have available. Crystal (2010) expressed the shortcomings of discovery platforms, including the lack of complete coverage for all of the library's resources. Lown, Sierra, and Boyer (2013) addressed that it is important for libraries to think carefully on how to present discovery platforms along with those research tools that overlap in functionality, saying that "the variety of strategies employed by libraries to present and architect search indicated both the strong desire to get search and discovery right, and the complexity and difficulty of doing so" (p. 27). How to better integrate all collected open web resources into a single discovery system, therefore, remains an unsolved issue in the literature.

METHODOLOGY

Realizing that open web resources are affecting scholarly research, this study analyzed open web resource collections on ARL academic library research/subject guides. Open web resources are a broad category of resources such as governmental websites, organizational websites, nonprofit websites, and individual open access journal articles housed on research/subject guides. For this paper, the definition of open web resources is any freely accessible website that an academic entity utilizes in a scholarly manner, such as cited in a scholarly article or linked to a research/subject guide. The evaluation of the content of the websites is not included in this paper; the mere act of the citation linked to a library website qualifies the resources as an open web resource for this analysis.

As of this writing, there are 125 ARL libraries, all but ten of which are academic libraries. To explore how academic libraries were connecting patrons to this valuable information on the Internet, the researchers designed a way to analyze open web resources collections at the 115 academic libraries. In addition, the researchers wanted to

discover the best solution to make open web resources on the libraries' subject websites searchable and discoverable to patrons.

To begin this research, each ARL academic library website was visited and mined to find the central portals of academic-valuable open web resources. Based on the findings of Hill and Bossaller's (2013) and Ghaphery and White's (2012), libraries usually collect valuable open web resources by means of research/subject guides, either on traditional web pages or on content management system such as LibGuides. With findings from the previous research in mind, when visiting each ARL academic library website, the researchers focused on identifying open web resources on the libraries' research/subject guides. The first step in the process intended to identify if each ARL academic library was collecting open web resources in some manner.

Once the identification of the web resources was completed, the next step was to find out how the academic libraries presented the web resource collections to patrons and if the ARL academic library made the collection searchable anywhere on the academic library website. In this step, researchers utilized a table to record what tools libraries were using to display open web resources. Researchers examined library website pages to see if search boxes were provided and where search boxes were placed to try to determine if libraries were making open web resources discoverable. Each main library website was visited and all search boxes on the main page were tested. These search boxes could be a discovery service, a website index search box, or a research/subject guide search box. Researchers then utilized the same text search strings, including "Global Warming", "Motor Skills", "Sociology", "African American", "Women Studies", and "Civil War and History," in each collection to test the search results. These terms were selected to in order to be very broad so that the researchers could focus on the location of the results, not the content of the results. This study was not assessing the quality of the linked open web resources, but if that specific ARL library was collecting any open web resources and making the collection searchable to its patrons. Usually more than one search was performed at each library in order to verify the location of the open web resources. Since the researchers knew the content that was in the open web resources collection for each library, which was identified in step one, researchers could then look for where the results to the specific items were being pulled. The researchers then assessed if the open web resources were populating in the results.

Subsequently the discoverability issues have been identified and remained unsolved according to the literature, the researchers proposed a solution to make the full text of the open web resources searchable on the library websites, thus improving the experience of patrons discovering the open web resources collections.

RESULTS

All 115 ARL academic libraries collect and present open web resources by means of research/subject guides. Where the variable lies is how research/subject guides are

developed. In this research, as shown in Figure 1, researchers found that 25 academic libraries were using self-developed web pages, while the other 90 libraries were using the popular content management system LibGuides.

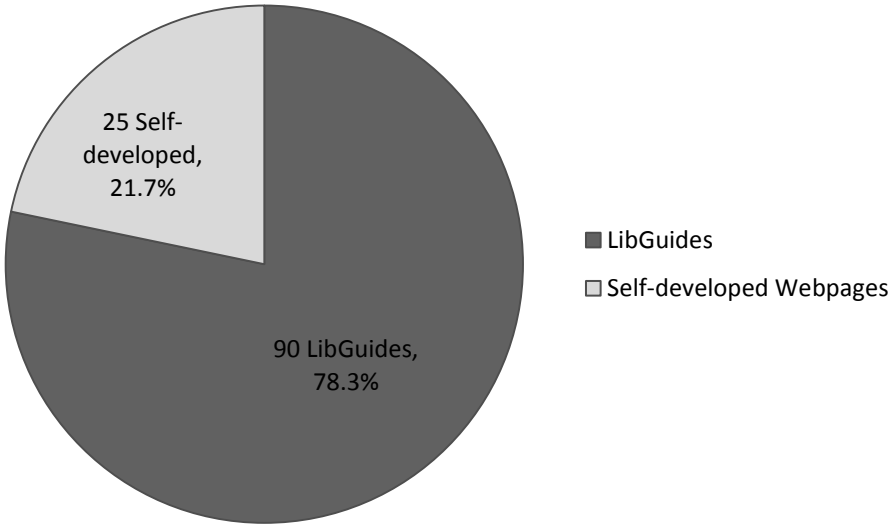

Figure 1: LibGuides vs. Self-developed Web Pages

The open web resources have to be discoverable by patrons if the resources are to be utilized. Through a thorough examination, researchers found that some of these libraries make their open web resources searchable by implementing search boxes in some way, while others have not made the open web resources discoverable at all.

To determine how a user would locate the research/subject guides and the open web resources on the library website, the researchers performed two tests. The first test looked at the discovery system on each ARL Libraries website. A discovery system is designed to pull search results from multiple places for instance, most include the library catalog, databases, and local collections. The researchers expected to find hits from the research/subject guides to populate the search results from the discovery system; however, this was not the case. The second test included other types of search boxes located on each of the libraries' websites. Libraries in general tend to have a library website search box and some have a search box for the research/subject guides. All of these search boxes were tested in order to determine if the open web resources would populate in any of the results.

As Figure 2 shows, although 23 of ARL's academic libraries have collected open web resources, researchers did not find any specific search boxes developed for research/subject guides on any page of the library website. When researchers tested the search string through the libraries' discovery systems the content, the description, and titles of the open web resources were not populated in the result pages. The researchers thus determined that these 23 academic libraries, 20 percent of the total, failed to make research/subject guides and therefore the open web resources searchable on their websites

in some way. The only way to get to this information is by navigating to it through a number of clicks on the libraries' websites.

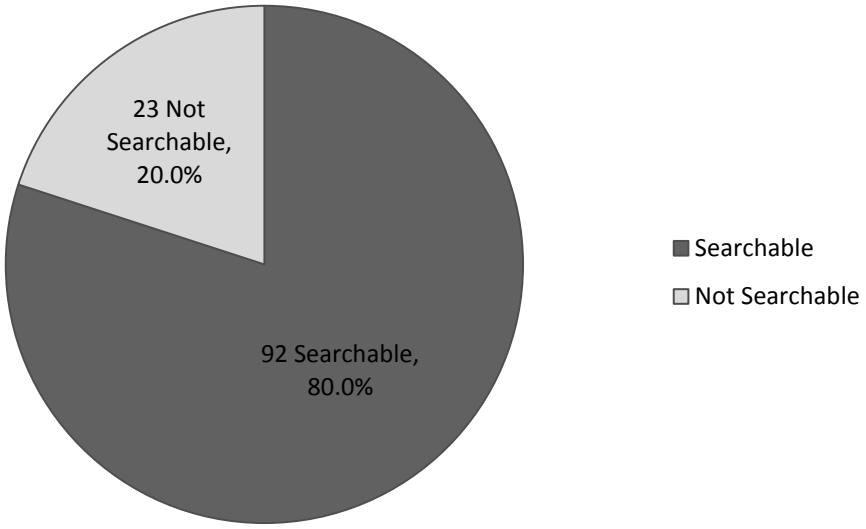

Figure 2: Searchable vs. Not-Searchable

However, 92 libraries included at least some type of search box specifically for their research/subject guides that contained open web resources. The libraries seem to do so in three ways. First identified way of including a search box was to place it on the main page of the library website. Next libraries utilized the research/subject guides and would have a search box at the directory level of the guides. Finally, the researchers found that libraries placed a search box at the individual page level of research/subject guides. Therefore, 80 percent of the libraries studied have a way to search the descriptions or titles of the collected links. While these libraries utilized a least one search box somewhere on the library website to help users locate the research/subject guides and the open web resources on the libraries website, researchers found that neither the content nor the description or titles of open web resources was searchable in the discovery systems.

As shown in Figure 3, most libraries (65 of these 92) had their search boxes on both the directory level page and the individual level page of research/subject guides. The majority made these resources only searchable from the directory level page or its subpages, meaning that in order to search for or get to open web resources the patron must click at least once from the library main page.

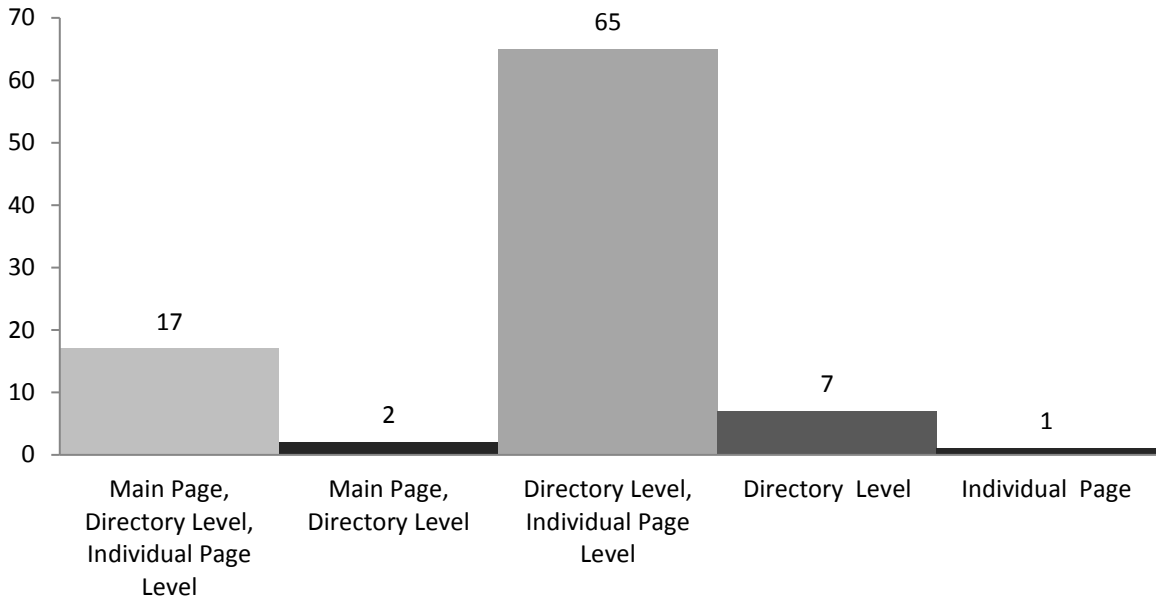

Figure 3: Search Box Locations

The researchers theorized it would seem logical that libraries, in general, adopted the practice of including a search box for the open web resources on the main page. Seventeen libraries made their search box of open web resources available in all three locations not only on the directory and individual level pages but also on the library main pages, where users are able to utilize these resources without any additional clicks. In addition, two libraries put the search box on the library main page and directory level page. Therefore, only 19 libraries had the open web resources discoverable from the main library website, while 96 of the 115 libraries studied here did not make open web resources searchable from the main page of the library.

Seven out of 92 libraries made the search box for the open web resources on the directory level of research/subject guides, while only one library exclusively placed the search box on the individual page level of guides. Since 92 libraries utilized at least one of the search tactics, it is interesting to note that 84 were utilizing more than one search tactic, allowing the patron to decide how to look for this information.

DISCUSSION

Keyword searching of the description or title of the open web resources stored on the libraries research/subject guides was the only search option available, which seemed problematic. Eighty percent of the ARL academic libraries had a way to search the collected links, however, none of these searches actually searched the content or full text of the open web resources. It appeared from the researchers' point of view that the

searching function was vital to the patrons even discovering these open web resources. Still to coincide with patrons searching behavior expectations, the open web resources collections will only be useful to the patron if the search function brings back search results that included the harvested content or full text.

With the question of how to make the real content of linked open web resources discoverable on the library website, researchers unearthed an option to resolve this issue. The solution to address the discoverability issue of open web resources is the deployment of a Google Custom Search Engine.

By creating a Google Custom Search Engine where each link in the open web resource collection is included, the performed search would find results from the open web resources websites, not from the library website. The search box can be deployed on the library website main page, directory level, or individual level of research/subject guides. However, from the perspective of the researchers the best place to use Google Custom Search Engine would be on the main page of the library website. Google (2014) defines their Custom Search Engine as a tailored search experience, built using Google's core search technology, that prioritizes or restricts search results based on the websites and pages one specifies. This engine only allows searching of specific sites such as the collections developed by the librarians making the content of the linked websites discoverable from the library website.

Each librarian can set up a Google Custom Search Engine specifically for their focused disciplines and place the search box on the research/subject guide. In order to do so, the librarian has to identify the open web resources that will be included in the search engine. Once this task is completed, the librarian can set up a Google account for Google Custom Search Engine on the website https://www.google.com/cse/. Once logged in, the librarian can start to build the search engine. Figure 4 is the interface where a librarian can set up and configure the custom search engine. The librarian can enter as many URLs as needed, select the language of the search engine, name the search engine, and finally, click the create button.

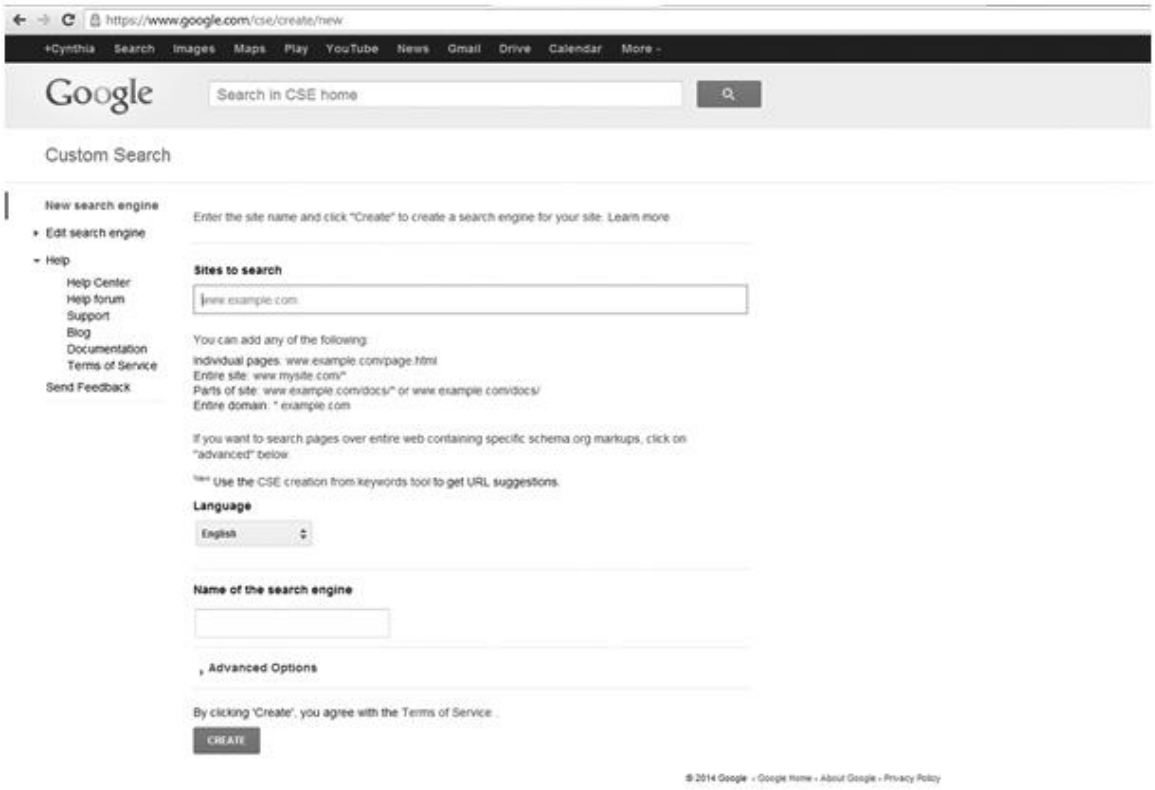

Figure 4: Backend of Google Custom Search

On the next, screen in the process, as shown in Figure 5, a statement of "Congratulations! You've successfully created your Custom search engine" will show up once the custom search engine is created. From this page, the librarian will be able to get the code of the search box for deploying on the library's website.

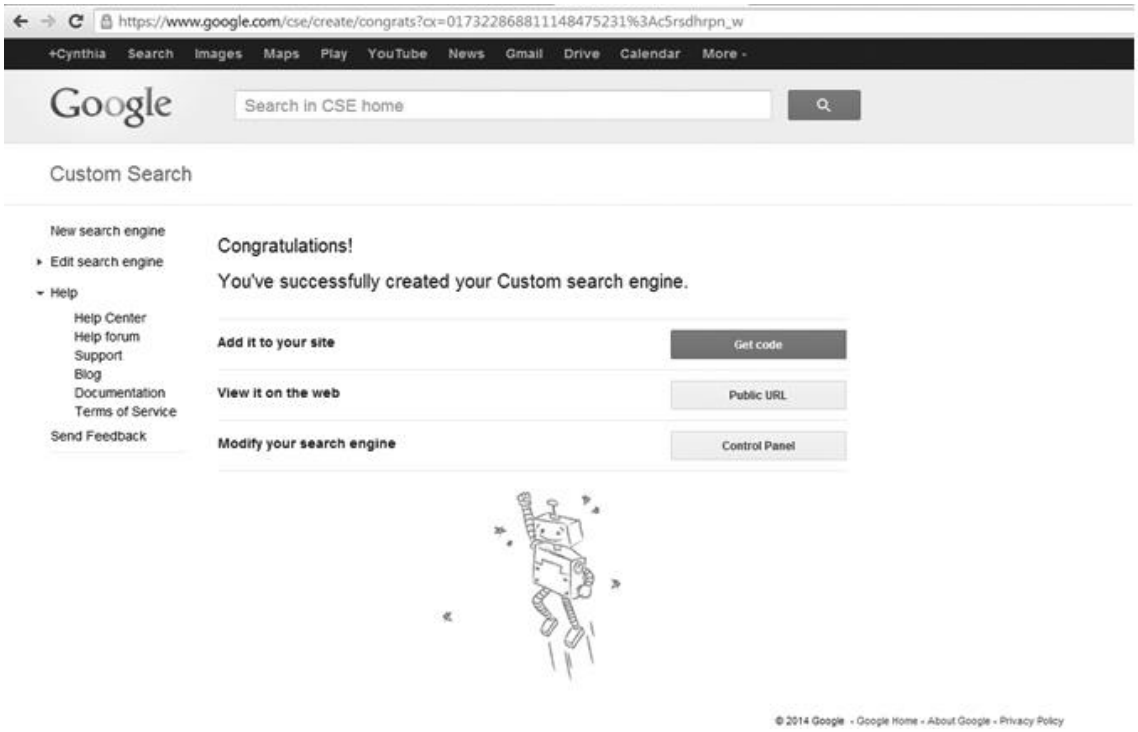

Figure 5: Successful Creation of Google Custom Search

To put the Custom Search Engine on a website, the librarian needs to click on the "Get code" button, a grey box pop up will appear with the code in it. The code should be similar to this:

```
<script>
  (function() {
    var cx = '017322868811148475231:vlpeaqmhr6e';
    var gcse = document.createElement('script');
    gcse.type = 'text/javascript';
    gcse.async = true;
    gcse.src = (document.location.protocol == 'https:' ? 'https:' : 'http:') +
        '//www.google.com/cse/cse.js?cx=' + cx;
    var s = document.getElementsByTagName('script')[0];
    s.parentNode.insertBefore(gcse, s);
  })();
</script>
<gcse:search></gcse:search>
```

However, if the librarian is familiar with code they will notice that the last line should be split with **<gcse:search>** going to the front of the code and leaving **</gcse:search>** as the last line of the code. The code will then read something like this:

```
<gcse:search>
<script>
```

```
 (function() {
  var cx = '017322868811148475231:vlpeaqmhr6e';
  var gcse = document.createElement('script');
  gcse.type = 'text/javascript';
  gcse.async = true;
  gcse.src = (document.location.protocol == 'https:' ? 'https:' : 'http:') +
     '//www.google.com/cse/cse.js?cx=' + cx;
  var s = document.getElementsByTagName('script')[0];
  s.parentNode.insertBefore(gcse, s);
 })();
</script>
</gcse:search>
```

Once the code is copied and pasted into the desired place of a web page, the Google Custom Search Engine is successfully set up on the library website. Searches performed through this search box not only search the full text content of the linked open web resources, but also brings harvested results from those linked to the library website. As seen in Figure 6, a Google Custom Search Engine sits on the Human Development & Family Studies research/subject guide at [link insert after peer review].

[To ensure a blind review, insert Figure 6 here after reviewing]

Figure 6: Implementation of Google Custom Search

Open web resources can be categorized by classes, disciplines, or subjects. Librarians can choose to put together links of collected open web resources into the Google Custom Search Engine and implement the search box on any web page, including implementing the search box on the individual research/subject guides. The library can also deploy a central custom search box on the library main page that includes all links of open web resources from librarians, allowing patrons to search and gain access to all collected web resources at once.

CONCLUSION

Open web resources have been valued in academia and cited in scholarly articles, therefore, libraries should attempt to make the resources a logical addition to patron research. Recognizing the importance of valuable open web resources, researchers found literature about how academic libraries are collecting and presenting the academic-valuable open web resources. Researchers exploring how academic libraries make open web resources discoverable and accessible, set out to study practices in place at ARL academic libraries. In order to find answers to these questions, this study examined 115 libraries' collection of open web resources and performed test specifically looking at each

library to first determine if the library had a collection of open web resources, then how the open web resources could be located on the libraries' websites, and finally if the open web resource collection was searchable.

By looking at all 115 ARL academic library websites, the researchers found that, all of the libraries had been collecting and presenting academic-valuable web resources by means of research/subject guides, either through self-developed web pages or a content management system such as LibGuides. The results showed that these libraries regard “research” as an important service in their library mission and value resources including open web resources.

Through observation, researchers also found that some libraries had integrated the open web resources better than other libraries. Implementing a search function for the open web resources seems critical in order for patrons to find and use the information. However, all observed libraries failed to integrate open web resources into the discovery systems. Researchers found that 92 out of the 115 libraries have had the descriptions or titles of open web resources searchable by implementing specific search boxes on different levels of the website, including the library main page, directory level of research/subject guides, and individual level of research/subject pages. Twenty-three of these libraries have not dedicated any search functions for research/subject guides or open web resources. Since libraries are collecting open web resources and going through the trouble of hosting it by linking the items on subject guides, it is confusing as to why the collected open web resources are not consistently searchable.

Implementing a search function for the open web resources on the main library page seems critical in order for patrons to find and use this information. Nineteen out of 115 observed libraries have successfully done so, which appeared to be the first step in improving the use of open web resources.

Performing the test searches and looking at the populated results, researchers identified that the search functions implemented by those libraries were merely keyword searching against the description or titles on the guides. In order to improve the experience of full text content searching and discovering open web resources, researchers proposed a solution of a self-administered Google Custom Search Engine. The introduction of the search engine not only allows for the content of the open web resources to be searchable but also brings back harvested results from the external resources to the library webpage.

Moreover, since all of these libraries have their librarians develop individual-level pages, the inclusion of the Google Custom Search Engine can be the second step in making the most use out of the open web resources as it allows for the open web resources content to be discoverable. Clearly, a patron cannot use a resource if it is not discoverable. By using a centralized search box, all open web resources can be implemented on the library main page to advance user experience of discovering the open web resource collections.

Current literature recognizes the value and importance of open web resources being referenced in scholarly publications, but rarely discusses how open web resources are collected and presented in academic libraries. The research findings presented here contribute to the literature of academic libraries' collecting, presenting, and discoverability of open web resources. Further studies, however, are still needed to provide a holistic investigation on patrons' opinions in regards to valuable open web resources and if patrons find the curated collections useful. Surveys and focus groups need to be implemented to determine the best locations of the search box for open web resources. Usability testing needs to be conducted to examine the value of having a search box on the library main page for the open web resources and how patrons use the Google Custom Search Engines in their research.

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