CITE IT RIGHT: CRITICAL ASSESSMENT OF OPEN SOURCE WEB-BASED CITATION GENERATORS

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INTRODUCTION

Writing proper citations is a critically important part of the research process. Citing involves careful documenting the sources of those individuals whose ideas and studies have direct influence on one's research. Citing sources acknowledges the origin of information, and allows others to find the source materials. Instructing students when and how to cite is a key component of information literacy initiatives for many academic and research libraries. To further support students, many libraries have purchased the licenses to bibliographic management software packages such as RefWorks and EndNote to help manage citations. Oklahoma State University provides the Endnote software, and the library provides user training and tech support to all students and faculty. EndNote has the capability of importing citations directly from subscription databases, and the capability of managing a large number of bibliographies formatted in a variety of citation styles. Nevertheless, the drawbacks of these products are several: they are expensive, they have an extensive learning curve, and they often require assistance from librarians.

Recently, a number of free or inexpensive Web-based citation generators including EasyBib, NoodleBib, BibMe, KnightCite, Citation Machine, Citation Builder and SourceAid have emerged and gained the attention of students as well as teaching librarians. These programs not only are very accessible via the Web, they are designed to be easy to use. Input templates

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are available in these programs that allow the users to quickly and easily create citations in a variety of source types (books, journals, magazines and newspapers); formats (print or online); and output styles (MLA, APA or Chicago).

While these tools are designed to emphasize ease of use, the accuracy of these programs remains to be investigated. In other word, are any of these tools reliable enough to be recommended to students? This study took a critical approach to assess the accuracy of these citation generators. The findings of this study will hopefully shed some light on the suitability of free web-based citation generators for college students.

LITERATURE REVIEW

While there are studies reviewing the bibliographic management software packages like EndNote or RefWorks, there is very little written about free Web-based citation generators. Kessler (2007) reviewed the program of SourceAid Pro PE, a Web-based citation generator. While SourceAid Pro PE has some attractive features such as the capability of generating bibliographies in APA, MLA, CMS and CSE, Kessler noted that due to the errors produced in the program and the lack of input instructions, users are very likely to generate incorrect citations. Jennings (2003) compared basic features of the citation generator EasyBib and the bibliographic management software RefWorks. The author rated EasyBib higher than RefWorks, despite the more advanced functionality of RefWorks, noting that entering references manually is more difficult in RefWorks than EasyBib, and that undergraduates found RefWorks difficult to use and required more assistance from librarians. Kessler and Van Ullen (2005) conducted a thorough study comparing two citation generator programs, EasyBib and NoodleBib with EndNote, for accuracy, ease of use and suitability for an undergraduate environment. The study
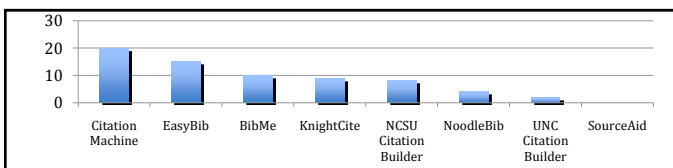
analyzed bibliographies generated by these three programs in the APA style format (5th edition). Errors were also categorized into user errors, software errors and other error types, and the overall results showed that NoodleBib generated the fewest errors, and EasyBib produced the highest rate of errors. Kessler and Van Ullen concluded that free programs such as NoodleBib and EasyBib may offer some advantages to undergraduates, but they also emphasized that some knowledge of proper citation formats is necessary to use these programs effectively.

Background

In order to determine which citation generators would be examined in this study, two preliminary investigations were undertaken by the author. A Google search for 'Citation Generator' and a search for 'Citation Builder' were performed. A web survey of 126 ARL member libraries was also conducted to see what free citation generators were recommended by libraries. Figure 1 shows the results of the survey of ARL member libraries. Of the 39 ARL library websites that recommended citation generators by linking, 20 libraries linked to Citation Machine, 15 linked to EasyBib, 10 linked to BibMe, 9 linked to KnightCite, 8 linked to NCSU Citation Builder, 4 linked to NoodleBib Express, and 2 linked to UNC Citation Builder.

Figure 1: Number of Links of Citation Generators by ARL Member Libraries

These same eight web-based citation generators were elected for this study. To determine whether all eight citation generators support the latest edition of the MLA, APA and Chicago formats, a review of each citation generator's website was conducted. This step involved a review of the *HELP* section or the *Q&A* section of the program homepage. The results are listed in Table 1.

Table 1: Citation Styles and Editions Available in Citation Generators

	MLA	APA	Chicago
NoodleBib Express	7	6	16
EasyBib	7	6 (subscription required)	16 (subscription required)
KnightCite	7	6	15
Citation Machine	7	6	15
NCSU Citation Builder	7	6	N/A
UNC Citation Builder	7	5	15
BibMe	7	5	15
SourceAid	6	5	15

The results indicate that most of the free citation programs support the latest (7th) edition of MLA. Five of the eight citation generators support the latest (6th) edition of APA.

NoodleBib and EasyBib are the only programs that support the latest editions of MLA, APA and Chicago styles. While most of these programs are completely free, EasyBib offers free access to MLA but requires subscription to use APA and Chicago.

Data Collection

Sample references from the current editions of the *MLA Handbook for Writers of Research Papers* (7th edition, 2009)*, Publication Manual of the American Psychological Association* (6th edition, 2010)*, and The Chicago Manual of Style* (16th edition, 2010) were used to test the accuracy of citation generators. A total of sixty-three sample references from three style manuals were selected. These sample references covered commonly used source types including: book by a single author; book by multiple authors; anthology; book chapter or a work in an anthology; thesis or dissertation; journal, magazine and newspaper articles; entry in a reference work; and website. Twenty-two sample references were selected from the MLA handbook, 18 sample references were selected from the APA manual, and 23 references were selected from the Chicago manual.

Sample references were then manually entered into citation generators by the author to create bibliographies for data analysis. The bibliographies were then reviewed and compared to the sample references from the citation manuals to determine the accuracy of the free citation programs. Errors were then recorded and categorized in Excel spreadsheets. Errors were categorized as the following: incorrect capitalization; punctuation error; improperly formatted retrieval statement; publication date; problem with volume or issue information; problem with formatted page number; error in publisher and/or place of publication; and syntax errors, which involved incorrect placement of elements within a citation. An example of a syntax error is:

(1) Bordo, Susan, Pamela R. Matthews, and David McWhirter. "The Moral Content of Nobokov's Lolita." *Aesthetic Subjects*. Minneapolis: U of Minnesota P, 2003. 125-52. Print.

The correct format based on MLA is:

(2) Bordo, Susan. "The Moral Content of Nobokov's *Lolita*." *Aesthetic Subjects*. Ed. Pamela R. Matthews and David McWhirter. Minneapolis: U of Minnesota P, 2003. 125-52. Print.

If multiple types of errors were present within any citation, each error was noted. If the source output template was not included in the free software (for example, several programs lacked the templates for theses and dissertations), this was recorded and categorized as an error.

Error Analysis of MLA Style Format

A total of twenty-two sample references from the *MLA Handbook for Writers of Research Papers* were entered into seven of the eight citation generators—no sample references were entered in SourceAid since it did not support the current

edition of MLA. Of the twenty-two sample references, fourteen were print publications and eight were web publications. These sample references are further detailed in Table 2:

Table 2: Sample References from *MLA Handbook*

Print Publications	Web Publications
Book by a single author Book by more than 3 authors An anthology Book by a corporate author Book in a subsequent edition A translation Published Dissertation Work in an Anthology Article in a specialized reference work Article in a (well-known) encyclopedia Entry in a (well-known) dictionary Article in a scholarly journal Article in a magazine Article in a newspaper (non-consecutive pages)	Book, single author, Google Book Search Dissertation Article in a (well-known) online encyclopedia Article in a scholarly journal, in library database Article in a magazine, in library database Article in a newspaper, non-consecutive pages, in library database Website

Figure 2 shows the total number of errors generated by each program in the MLA format. NoodleBib and EasyBib produced the lowest numbers of incorrect citations in MLA format-- 2 errors (or 9 percent of total errors) and 3 errors (13.6 percent of total errors) respectively, while Citation Machine yielded the largest number, generating 19 errors (86 percent of total errors).

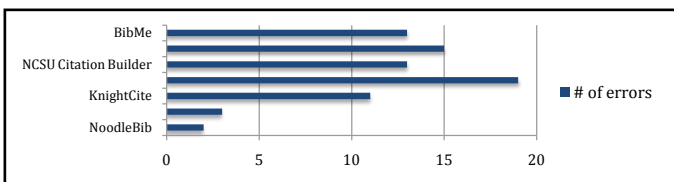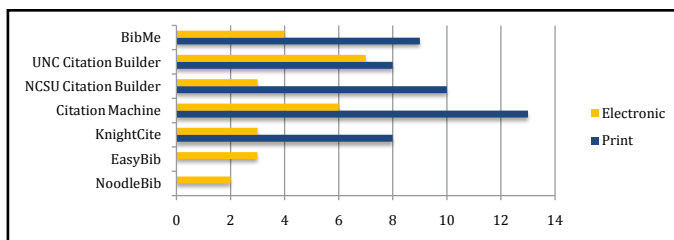**Figure 2: Total Errors Produced by Citation Generators in MLA Style**

Figure 3 shows the errors produced from print sources as compared to electronic sources for all seven programs.

Figure 3: Error by Formats in MLA

Citation Machine generated the highest number of errors for print sources, while UNC Citation Builder produced the highest number of errors for electronic sources. NoodleBib and EasyBib did not produce any errors for print sources; all errors were for electronic sources.

Several programs did not have the capability of generating citations for specific source types such as PhD dissertations. Only NoodleBib and EasyBib included templates

for theses and dissertations. Syntax errors were also common in the citations produced by several citation programs. One such syntax error came from the program's inability to accommodate different contributors to a source. An example citation is:

(3) Homer. *The Odyssey*. Trans. Robert Fagles. New York: Viking, 1996. Print.

Several programs generated a error citation as:

(4) Homer, and Robert Fagles. *The Odyssey*. New York: Viking, 1996.

ERROR ANALYSIS OF THE APA STYLE FORMAT

To test the APA style citations, a total of eighteen samples from the *Publication Manual of the Psychological Association* were entered in NoodleBib, EasyBib, KnightCite, Citation Machine and NCSU Citation Builder since they all supported the latest edition of APA. Of the eighteen sample references, seven were print sources and eleven were electronic sources. These sample references are further detailed in Table 3:

Table 3: Sample References from *Publication Manual of APA*

Print Sources	Electronic Sources
Entire book, single author Book chapter Reference book Entry in a reference book Article in a scholarly journal Article in a magazine Article in a newspaper, non-consecutive pages	Master's thesis, from a commercial database PhD Dissertation, from an institutional database Electronic version of a book Electronic only book Entry in an online reference work Entry in an online reference work, no author/date Journal articles, with DOI** Journal article, with DOI, more than 7 authors Online journal article, without DOI Online magazine article, without DOI Online newspaper article, without DOI **DOI is an abbreviation for Digital Object Identifier, a unique alphanumeric string (e.g. doi: 10.1086/597483) assigned to a publication. As a digital identifier, a DOI also provides a means of looking up the current location of the publication on the Web. The latest editions of APA (6th) and Chicago (16th) recommend the inclusion of a DOI when it is available.

Figure 4 shows the total number of errors generated by these programs. NoodleBib produced no errors in APA, while EasyBib produced a total of 6 errors (33.3 percent of the total number of errors) and Citation Machine yielded the largest number, generating 14 errors (77.8 percent of total errors).

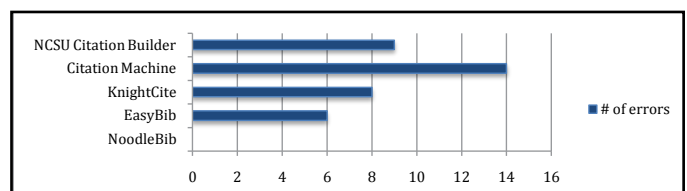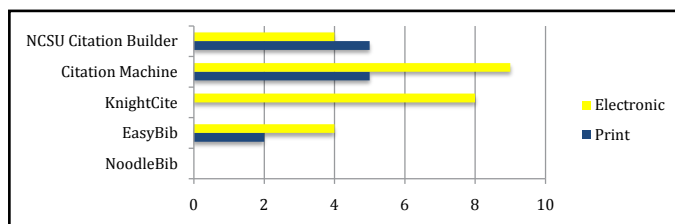**Figure 4: Total Errors Produced by Citation Generators in APA Style**

Figure 5 sorts the APA errors by print or electronic format.

Figure 5: Error by Formats in APA

Citation Machine and NCSU Citation Builder produced the highest number of errors for print formats (each produced 5 errors, or 71 percent of the total number of errors), while Citation Machine generated the highest number of errors (9 errors, or 81 percent of total errors) for electronic sources. A closer examination of electronic format errors revealed that Citation Machine was the only program that generated errors in the online retrieval statement where a DOI number was involved. The program provided a source template for electronic sources that allows the users to fill in a URL and a DOI, but did not give clear instructions to the users how to use DOIs versus URLs when citing online sources. When both a DOI and a URL were entered in the template, the program Citation Machine did not have the capability of generating only the DOI number in the citation, as NoodleBib and EasyBib were able to.

KnightCite produced no errors for print sources but generated 8 errors (72.7 percent of total errors) for electronic sources. Most of these errors in KnightCite involved incorrectly adding date of retrieval to citations where this information was not necessary. According to APA, no retrieval date is needed for online sources unless the source material may change over time such as Wikis. The incorrect citations generated in KnightCite were mostly electronic books or an entry from an online reference work or from an online periodical.

Error Analysis of the Chicago Style Format

To test the Chicago style citations, a total of twenty-two sample references from *The Chicago Manual of Style* were entered in NoodleBib and EasyBib since these were the only programs that supported the latest edition of Chicago. Of the twenty-three sample references, twelve were print sources and eleven were electronic sources. These sample references are further detailed in Table 4:

Table 4: Sample References from *Chicago Manual of Style*

Print Sources	Electronic Sources
Book, one author	Book published electronically, Kindle edition
Book with an editor	Book published electronically, without DOI
Book, more than 2 authors	Book published electronically, with DOI
Book, more than 2 editors	Book review, consulted online
Book, organization as author	Online encyclopedia
Book, edition other than the first	Article in a journal, with DOI
Citing a multi-volume as a whole	Article in a journal, without DOI
Chapter in an edited book	Article in an online magazine
Article in a journal	Article in an online newspaper
Article in a magazine	Digital dissertation
Article in a newspaper	Website
Series title	

Figure 6 shows the total number of errors produced by NoodleBib and EasyBib when generating citations in Chicago style. Both programs performed quite well in the Chicago style format, as each produced only 2 errors (8 percent of the total number of errors).

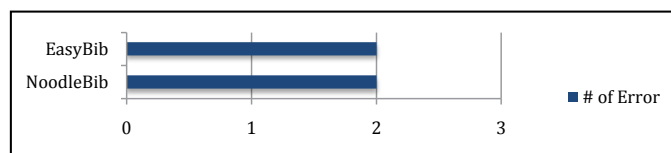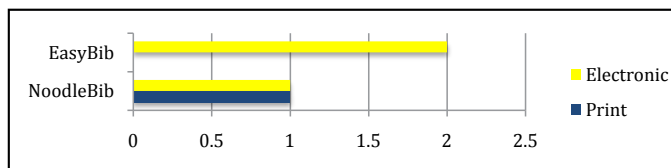**Figure 6: Total Errors Produced in Chicago Style**

Figure 7 shows print versus electronic errors in Chicago produced by NoodleBib and EasyBib. NoodleBib generated 1 error for print sources and 1 error for electronic sources, while EasyBib generated 2 errors for electronic sources.

Figure 7: Error by Formats in Chicago Style

Incorrect citations in NoodleBib included minor errors in the publication information. The errors produced in EasyBib involved incorrect punctuation in the citation for a digital dissertation in (5), and a syntax error in the citation for an entry in an online encyclopedia in (6) where the title of article was missing:

(5)　　Choi, Mihwa. *Contesting Imaginaries in Death Rituals during the North Song Dynasty.* Diss., University of Chicago, 2008. ProQuest.

Compared to the citation given in *The Chicago Manual of Style*:

Choi, Mihwa. "Contesting *Imaginaries* in Death Rituals during the Northern Song Dynasty." PhD diss., University of

Chicago, 2008. ProQuest (AAT 3300426).

(6)   Isaacson, Melissa. *Encyclopedia of Chicago.* Edited by Janice L. Reiff, Ann D. Keating, and James R. Grossman. Chicago: Chicago Historical Society, 2005. http://www. encyclopedia.chicagohistory.org/pages/184.html

Compared to the citation given in *The Chicago Manual of Style*:

Isaacson, Melissa. "Bulls." In *Encyclopedia of Chicago*, edited by Janice L. Reiff, Ann D. Keating, and James R. Grossman. Chicago Historical Society, 2005. http://www. encyclopedia.chicagohistory.org/pages/184.html.

Discussion

Based on the above analyses, NoodleBib and EasyBib emerged as the top citation generators. Not only did NoodleBib and EasyBib support the latest editions of MLA, APA and Chicago styles, these tools also performed more accurately compared to other free programs, with NoodleBib ranking slightly higher than EasyBib. The greater accuracy of these two programs was attributed to the online help tips provided. For instance, NoodleBib provided rather extensive step-by-step, field-by-field help to instruct the users on the various citation rules and conventions as required by the appropriate citation style. The NoodleBib data entry screen, shown below, contained the following instructions on how to format an online retrieval statement for a citation in Chicago style:

Online retrieval: Basic information

DOI assigned to the source, if available

doi:

Test this DOI (opens new browser window)

A DOI is a unique alpha-numeric string assigned by a registration agency like CrossRef.org. A *DOI resolver* can then be used to locate the source using the DOI. For example: doi:10.1037/0002-9432.76.4.482. If you cannot find a DOI number for your source, you can try looking it up using the CrossRef free DOI lookup.

URL

http://

Leave blank if you have provided the DOI above. If citing content from a database and no stable, persistent URL is available, leave this field blank and provide the database name below. Help with URLs

Name of database

If source is retrieved from a subscription database, provide the database title. Note: The database name will only appear in your final citation if no DOI or URL is specified above.

Database accession number

For example, an ERIC number like *ED498566*.

Most recent date of access (M, D, YYYY)

Leave this field blank unless your teacher or publication requires it, or it is the ONLY date to cite (i.e., no date of print or electronic publication or revision is provided by the source).

Another example that illustrates helpful instructions is the MLA rules for publisher abbreviations provided in NoodleBib. This help screen, shown below, would be helpful to users who are unfamiliar with the style requirement:

EasyBib also provided a similar help screen:

CONCLUSION

Open source web-based citation generators have emerged in recent years as alternatives to subscription-based bibliographic management software packages like EndNote and RefWorks. This study examined the accuracy of eight citation generators. Based on the accuracy of the bibliographies they produced, NoodleBib and EasyBib proved to be the most reliable citation generators out of those studied. However, even the best free programs are not completely without errors and limitations. Some 'free' programs, such as EasyBib, allow the users to do certain tasks free of charge but require payment for other functions. If librarians recommend these tools to students, they should also provide guidance to students in regard to these programs. Instruction on how to use these programs would increase the accuracy of citations generated by students. Furthermore, as Kessler and Van Ullen (2005) point out, instruction on citation generators by librarians not only should include a sense of the limitations of these programs, but should specify that "the ultimate responsibility of accurate citations rests with the users" (p. 316). Even with high accuracy programs like NoodleBib and EasyBib, the need for students to consult the appropriate style manual cannot be stressed enough.

REFERENCES

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