Enlisting Social Media to Facilitate Collaborative Bibliography Building

Abstract: Social media is an important everyday activity of most college-aged students. Such students are accustomed to collaborating with peers and seeking their advice. Bibliography building and library research generally are solitary endeavors. For most college students, these endeavors are fraught with difficulties. The time is right to investigate whether the infusion of social media into bibliography building enables students to leverage their bibliography building efforts with those of their peers so that everyone benefits. The purpose of this study is to determine whether the social media aspect of collaborative bibliography building benefits students tasked with finding information for their research papers. It enlists data and analyses from an actual information literacy game that had a social media aspect to its collaborative bibliography functionality and was played by undergraduate students to answer research questions about the development of their topics, the origins of the sources players cited in their research papers, the number of sources players and nonplayers cited in their research papers, and whether players were more likely than nonplayers to cite scholarly sources. Answers to this study’s questions demonstrate the promise of social media for collaborative bibliography building, research paper topic formulation, and library research generally.

Keywords: Collaboration; bibliographies; social media

Der Einsatz von Social Media zur Erleichterung kollaborativer Bibliographiearbeit


Schlüsselwörter: Kollaboration; Bibliographien; soziale Medien

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1 Introduction

Social media plays an increasingly important role in people’s lives transforming the ways in which they communicate, seek entertainment, participate in politics, get news, make purchases, and much more. Eighty-four percent of college-aged young people use social media, and half of them check their social media sites several times a day.1

Social media is making inroads into education as “a vehicle for broadcast communication, content delivery, back-channel communication, content development, and more” (Joosten, xiii). Librarians have embraced social media, using it to promote programs, services, and collections, raise funds, build social catalogs, and establish meaningful relationship with library users (Dankowski; Dowd; Harmon and Messina).

Inspired by the unmitigated popularity of social media, the author made it a prominent feature of a web-based information literacy game. The game’s social media functionality enabled undergraduate students to engage in collaborative bibliography, building a database of sources on an instructor-assigned, broad-based topic to which they added content tags, relevance and credibility ratings, and comments that explained their ratings. This functionality worked in tandem with the game’s scoring algorithm so that students earned points for participating in bibliography building activities and bonus points when their ratings and tags approximated those of their fellow players. After the game ended, students could use the shared bibliography while they wrote their research papers, searching for their own sources or those contributed by their classmates, downloading full-texts, checking content tags and ratings to determine if retrieved sources were good enough to cite in their papers.

1. Did the exposure students get to fellow students’ sources through collaborative bibliography building help them develop their paper topics?
2. Did students cite sources in their research papers that they and others found as a result of collaborative bibliography building?
3. Did students who engaged in collaborative bibliography with a social media aspect cite more sources in their research papers than students who worked alone?
4. Did students who engaged in collaborative bibliography with a social media aspect cite more scholarly sources in their research papers than students who worked alone?

Answers to these questions were sought to demonstrate the promise of social media to facilitate collaborative bibliography building, research paper topic formulation, and library research generally.

3 Literature review

Bibliography building and library research generally have always been solitary activities. They conjure up images of a lone library researcher, framed by stocked bookshelves, working late into the night, and relentless in the pursuit of knowledge, truth, and discovery. Over the last decade, social media has begun to chip away at this image. Available to researchers are the web-based Delicious (formerly del.icio.us) social bookmarking and CiteULike services for sharing links to favorite web pages and to scholarly sources, respectively (Delicious; CiteULike). Amazon encourages readers to submit book reviews and rate the usefulness of other readers’ reviews, and it awards prolific, high-rated reviewers badges that acknowledge their contributions (Amazon). Users of the Zotero citation management system can publish their library of saved sources as a Zotero Group, invite colleagues, fellow research team members, and even whole classes to the Group where everyone can add more sources to the library that includes citations, annotations, and full texts (Zotero). These are
but a few of the instances of social media technology that are making it possible to peel open and admit others into the “black box” of bibliography building activities that until very recently have been accessible only to the lone researcher.

Collaborative bibliography building with a social media aspect was at the heart of the BiblioBouts information literacy game (Markey, Leeder, and Rieh10). During game play, players contributed sources to a shared database of citations and full-texts on an assigned topic and evaluated them for relevance and credibility. When the game ended, players could search the shared database for relevant sources, check their evaluations, and cite the best ones in a research paper on the assigned topic.

To build BiblioBouts’ shared sources database, players engaged in research tasks that gave them experience and practice with every step of the library research process. The professional literature is rife with research findings that demonstrate students’ difficulties at each step of this process. Library research begins with topic formulation. Students do not know how to define a topic or narrow it down (Head and Eisenberg11; Head12), and because they are unsure of their topics, they have difficulty distinguishing between relevant and nonrelevant retrievals.13

Speed, convenience, and ease of use attract students to searching the open web where source credibility is problematic (Connaway, Dickey, and Radford14; Bawden and Vilar15; Griffiths and King16; Idaho Commission for Libraries17). They avoid library databases where source credibility is less of an issue because they feel such databases are inaccessible and their interfaces overly complex, unfriendly, and difficult to use (Kim and Sin18; Armstrong19). Asked to compare library sources to open web sources, students acknowledge the trustworthiness and accuracy of the former over the latter (OCLC20; Markey, Leeder, and Rieh21). Unfortunately, when tasked with a research paper, students revert to their habitual patterns and search Google, Wikipedia, and the web for information (Fast and Campbell22; Head 200723; Swanson24; OCLC25; Kolowich26). Their reliance on the web would be satisfactory if they were rigorous about evaluating what they find there but research findings tell us otherwise (Flanagin and Metzger27; Freeman and Spyridakis28; Rieh and Hilligoss29; Markey, Leeder, and Rieh10).

10 Markey, Karen; Leeder, Chris; Rieh, Soo Young: Designing Online Information Literacy Games Students Want to Play. Lanham, MD: Rowman & Littlefield 2014.


13 Head, Eisenberg (note 11).


Hargittai et al.\textsuperscript{30}). Metzger\textsuperscript{31} sums up the situation saying “people know they ‘should’ critically analyze the information they obtain online, yet rarely have the time or energy to do it.”

Compounding all these difficulties is students’ tendency to procrastinate (Valentine\textsuperscript{32}; Onwuegbuzie and Jiao\textsuperscript{33}) – putting off library research until the last minute – which robs them of opportunities deliberate on their research topics, evaluate the information they have found, and seek additional sources to cover their topics fully.

The rest of this paper describes how students responded to collaborative bibliography building that was facilitated by the social media aspect of an information literacy game.

4 Methods

The data for this study’s analyses were extracted from game-play logs that an information literacy game generated during game play. The game’s name was BiblioBouts, and its design, development, deployment, and evaluation were funded by a grant to this paper’s author by the Institute of Library and Museum Services (Markey, Leeder, and Rieh\textsuperscript{34}).

BiblioBouts was conceived as a series of mini-games or bouts. Playing each bout gave players practice with these information literacy skills – resource discovery, source selection, source evaluation, and best-source selection – while they experienced the overall research process from start to finish (Markey, Leeder, and Rieh\textsuperscript{35}). Game play was cumulative with players acting on sources at each step of the process. At the end of the game, BiblioBouts players had a best bibliography that listed their research paper’s topic and argument, the big ideas they intended to discuss, citations to the BiblioBouts sources they might use to write their research paper and links to full-texts. While writing their papers, players could search the Post-Game Library which contained everyone’s sources and player evaluations of these sources.

Pre-game preparation was necessary. Instructors assigned students a research paper on a broad-based topic and invited librarians to class to demonstrate relevant library databases and keywords so that students could follow up with searches that retrieved relevant sources on the assigned topic. Instructors also synchronized assignment deadlines with the BiblioBouts game and profiled each bout with a cap or quota that served as a baseline for how many sources students would find, evaluate, and select during game play.

Students searched online for sources on the broad-based topic and saved their citations and full-texts in the Zotero citation management system. BiblioBouts began with the Closer bout where students designated their five best sources to “do battle in the game.” BiblioBouts transitioned to the Tagging & Rating (T&R) bout in which players used the game’s social media functionality to tag and rate about twenty of their fellow classmates’ closed sources. BiblioBouts randomly chose an opponent’s source and displayed its title, citation, abstract, and a full-text link to players and tasked them with:

- A full-text check: Players responded yes or no to the question “Does the citation include the correct full-text?”

- A full-citation check: Players responded yes, no, or maybe to the question “Could you find this source using the information provided in the citation?”

- Tagging the source’s big ideas: Players entered words and phrases for three big ideas that the source covered.

- Tagging the source’s format: Players responded to the question “What is this source?” by choosing one entry from a list of format types (e.g., consumer newspaper, scholarly journal, book, blog)

- Tagging the source’s publisher: Players responded to the question “Who published it?” by choosing one entry from a list of publisher types (e.g., individual person, commercial business, higher education)

- Rating the source’s relevance: Players rated sources three times on a scale of 0 (not at all) to 100 (to a great extent) by responding to three questions “To what extent do you believe that this source is (written by an expert, trustworthy, scholarly)?”

- Entering a reason that explained why they gave the source these relevance ratings

\begin{thebibliography}{35}
\bibitem{30} Hargittai, Eszter; Fullerton, Lindsay; Menchen-Trevino, Ericka; Yates Thomas, Kristin: Trust Online: Young Adults’ Evaluation of Web Content. Journal of Communication 4 (2010) pp. 468–94.
\bibitem{34} Markey, Leeder, Rieh (note 10).
\bibitem{35} Markey, Leeder, Rieh (note 10).
\end{thebibliography}
Rating the source’s credibility: Players rated sources three times on a scale of 0 (not at all) to 100 (to a great extent) by responding to three questions “To what extent do you believe that this source (contains useful information, has accurate information, has a quality good enough for you to use in your course work)?”

Entering a reason that explained why they gave the source these credibility ratings.

In short, BiblioBouts gave students a methodology for evaluating sources-prompting them to do full-text and citation checks, tag the source’s intellectual contents, rate the source’s relevance and credibility, and give reasons for their ratings.

Figure 1 shows the BiblioBouts home page for a player with the alias “Bartholomewho.” In the center of the page are listed the dates of the game’s three bouts, a bout-by-bout breakdown of Bartholomewho’s score is on the top right, the score board listing all players’ final placement in the game is on the right center, and fellow players’ evaluations for Bartholomewho’s five closed sources (on a scale of 0 to 100) and the number of players choosing them for their best bibliographies are on the bottom right. Note that player evaluations for Bartholomewho’s five sources ranged from percentages in the 60s to the 70s and his closed sources were chosen eleven times for best bibliographies.

Because there were at least three evaluations per source, BiblioBouts’ scoring algorithm relied on its social media aspect, computing average ratings for each source, seeking a consensus amongst players regarding tags and checks, and rewarding players whose ratings approximated and checks and tags matched those of other players. Players wanted to rate the usefulness of other players’ comments, and had the BiblioBouts development team not run out of time and resources to implement this capability, the team would have had yet another social media aspect to factor into the game’s scoring algorithm. The final bout was Best Bibliography where players entered their research paper’s topic and selected ten sources from the pool of everyone’s sources that they would consider for their research papers on this topic. Social media also figured into this bout’s scoring – whenever a player added another player’s closed source to his best bibliography, the game added a super bonus to the closing player’s score. Winners of BiblioBouts games were players who met or exceed each bout’s cap or quota and submitted the most popular sources in the game.

BiblioBouts recorded every player action pertaining to a source to game-play logs. For this study’s analyses, data were extracted from the logs of three undergraduate classes at a large American research university. Table 1 summarizes important data about each class: the broad-based topic instructors assigned to students in the class, the brief name subsequent tables use to refer to each class, whether game play was mandatory (M) or extra credit (EC), and the number (N) of players in each class. Sculpture was two sections of one class, and logged data from the two sections were consolidated for the analysis. Players were defined as students who played BiblioBouts from beginning to end, meeting or exceeding each game’s caps and quotas.

Table 1: Classes That Played BiblioBouts

<table>
<thead>
<tr>
<th>Broad-Based Topic Assigned to the Class</th>
<th>Brief Class Name</th>
<th>M or EC</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human adaptation to climate change</td>
<td>Adaptation</td>
<td>EC</td>
<td>24</td>
</tr>
<tr>
<td>Social media &amp; 2012 election: Social media and other information technologies in the 2012 U.S. election</td>
<td>Election</td>
<td>EC</td>
<td>21</td>
</tr>
<tr>
<td>Public sculpture: A close reading of a work of art</td>
<td>Sculpture</td>
<td>M</td>
<td>23</td>
</tr>
</tbody>
</table>

Students from the three classes volunteered to participate in post-game focus group interviews. A total of four focus group interviews were conducted, one group each for the Elections and Sculpture classes and two groups for the Adaptation class. Students were paid $25 for their participation, and because interviews were held during lunchtime, pizza and soft drinks were served. Focus group interview comments were used to gain greater understanding of logged quantitative data.
5 Results

Answers to this paper’s research questions revealed whether students benefited from the social media aspect of collaborative bibliography building. Did exposure to so many sources during game play help them develop their paper topics? Did their research papers cite other students’ sources? Did players cite more sources and more scholarly sources in their research papers than students who did not play the game?

6 Developing research paper topics

BiblioBouts game play gave players several opportunities to develop their research paper topics. Starting in the Closer bout, players were advised to submit the best sources they could find on the broad-based topic to “do battle” in the game. Evaluating fellow players’ closed sources in the T&R bout exposed them to more sources on the broad-based topic. The Best Bibliography bout required them to describe their topic, and then build a best bibliography for this topic bearing ten sources from the pool of everyone’s sources. After their game ended, players wrote their research papers and could search the Post-Game Library for relevant sources.

It was hypothesized that most players would develop their research paper’s topic while playing BiblioBouts and that exposure to so many sources during game play would eventually enable them to identify a topic, articulate it in the form of their best bibliography topic, and stick with it while writing their research paper. Testing this involved an examination of the titles and abstracts of players’ closed sources, titles and abstracts of their best bibliography sources, their best bibliography topic, and titles and texts of their research papers to determine when they identified their research paper topics. Table 2 summarizes the results.

Results from the three classes were mixed. Very few Adaptation (4.8%) players settled on research paper topics during the Closer bout. A lot of (52.4%) Adaptation and Election (41.7%) players settled their topics or were close to doing so during the Best Bibliography bout. Research paper topics came down to writing the actual paper for 38.1% of Adaptation and 20.8% of Election students. A handful of Adaptation (4.8%) and Election (16.7%) students never developed a focus for their papers.

Sculpture students were totally different. All but one (95.7%) identified their topic during the game’s initial Closer bout. A likely explanation for this was the misalignment between deadlines for the individual pieces that made up the Sculpture assignment and for the various bouts of the BiblioBouts game. Just as the Closer bout began, Sculpture students were completing reflection papers that described their chosen sculpture’s physical presence. Because some students included both their personal interpretations and artist intentions in their reflections, they had already searched online for information, and thus, the Closer bout, with its emphasis on selecting sources for draft papers, was scheduled too late for them. They had already chosen a sculpture and stuck with it. Reviewing Sculpture students’ first drafts, the author noted that almost half (43.5%) were little more than annotated outlines or basic introductions to their topics. It did not matter – players stuck with their topics – filling in outlines, introducing new themes and subthemes, and adding a bibliography of cited sources to their final drafts. For BiblioBouts to have had a contribution to Sculpture students’ papers with respect to topic formulation, its Closer and Best Bibliography bouts should have been synchronized with deadlines for students’ reflection papers and first drafts, instead of with their first and final drafts, respectively.

Table 2: Identifying Research Paper Topics

<table>
<thead>
<tr>
<th>Development type</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closer bout</td>
<td>21</td>
<td>100.0</td>
<td>24</td>
<td>100.0</td>
<td>23</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3: Development of five students’ research paper topics based on when they settled on their topic: during the game’s Closer or Best Bibliography bouts,
whether they were still testing topic(s) during the latter bout, while writing their research paper or a research paper that had no central theme or focus.

7 Citing BiblioBouts sources in research papers

BiblioBouts gave players several opportunities to find sources for their research papers not only amongst the sources they submitted to the game but amongst the sources fellow players submitted to the game. Sources players cited in their research papers as a result of playing BiblioBouts are called "BiblioBouts sources." Table 4 summarizes the BiblioBouts sources students cited in their research papers.

The author randomly chose fifty percent of BiblioBouts players from the Adaptation, Election, and Sculpture classes; these classes are listed in Table 4’s left-most column. She extracted cited sources from their research papers; column 2 from the left lists the number of extracted sources per class. She checked these sources to determine (1) whether they were sources the player closed in the Closer bout (column 3 from the left), and if not (2) whether they were sources the player chose for their best bibliography (column 4 from the left), and if not (3) whether they were sources the player culled from the Post-Game Library after the game ended (column 5 from the left). In Table 2’s right-most column is the percentage of sources that students cited in their research papers that were a result of playing BiblioBouts—these are BiblioBouts sources! (This percentage is the sum of sources in columns 3, 4, and 5 divided by the number of extracted sources in column 2.)

Results from each class were quite different. Only 8.4 % of research paper sources cited by Adaptation players came from BiblioBouts. About one-third of Sculpture players’ research paper sources came from BiblioBouts. Adaptation and Sculpture students found most of sources...
on their own, contributing them to BiblioBouts during the Closer bout. Exactly 44.6% of research paper sources cited by Election players came from BiblioBouts. Unlike Sculpture players, Adaptation and Election players culled these sources while playing the Best Bibliography bout or by checking the Post-Game Library after the game ended.

Here are ideas that help explain disparities between the three classes. Students in the Adaptation class were expected to specialize choosing a particular population and discussing how the population was adapting to climate change. Their written papers discussed a wide variety of populations, e.g., Cubans, Americans, Chinese, Irish. Most likely, they disregarded BiblioBouts sources that addressed populations that were not the same as their chosen population.

The situation in the Sculpture class was much the same. Students chose one of seven outdoor sculptures on the university campus. Their final drafts interpreted the sculpture using explanation, description, and evidence that was a result of personal reflection, objective observation, and scholarly research. Like Adaptation students, they might have dismissed BiblioBouts sources that did not mention their chosen sculpture and/or its artist.

A considerable percentage (44.6%) of research paper sources written by Election students were the result of BiblioBouts sources. These sources came to their attention while they were evaluating them, while they were selecting them for their best bibliographies, or while they were writing their papers and had access to the Post-Game Library.

8 Number and research nature of cited sources in research papers

Instructors gave students these instructions about citing sources in research papers:

- Adaptation: Cite a minimum of seven sources of which only three could be from the open web
- Election: Provide proper citations to outside sources and cite a minimum three sources from the university library’s online or print collections.
- Sculpture: Cite a minimum of four “quality” sources

In Table 5 are the average number of sources players and nonplayers cited in their research papers. Adaptation and Election nonplayers did not play BiblioBouts at all. Because there were no nonplayers in the Sculpture class (playing BiblioBouts was mandatory in this class), a comparison was made between Sculpture players’ sources and Sculpture partial players’ sources. The latter were defined as Sculpture students who failed to play one or more bouts and/or failed to meet one or more bout’s caps or quotas.

Table 5: Number of Cited Sources in Research Papers

<table>
<thead>
<tr>
<th>Classes</th>
<th>Players</th>
<th>Nonplayers*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Number of Cited Sources</td>
<td>Average Number of Cited Sources</td>
</tr>
<tr>
<td>Adaptation</td>
<td>9.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Election</td>
<td>11.1</td>
<td>8.2</td>
</tr>
<tr>
<td>Sculpture</td>
<td>3.3</td>
<td>2.8</td>
</tr>
</tbody>
</table>

*In the Sculpture class, sources submitted by partial players were analyzed.

Players in all three classes cited more sources in their research papers than did nonplayers. Results were significant for Adaptation ($t(41) = 1.46, p < .035$) and Election ($t(74) = 2.90, p < .010$) classes. In the Election class, the difference was almost three sources. Although the Sculpture instructor instructed students to cite at least four sources in their research papers, neither players nor partial players met this goal, averaging 3.3 and 2.8 cited sources, respectively.

To determine whether players cited more scholarly sources than nonplayers, samples of cited sources were

<table>
<thead>
<tr>
<th>Topic</th>
<th>N Research paper sources</th>
<th>N Citations to one’s own closed sources</th>
<th>N Best Bib. citations to other players’ sources</th>
<th>N Citations to other players’ sources from the Post-Game Library</th>
<th>% of cited sources in research papers that are BiblioBouts sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation</td>
<td>190</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>8.4</td>
</tr>
<tr>
<td>Election</td>
<td>267</td>
<td>18</td>
<td>40</td>
<td>61</td>
<td>44.6</td>
</tr>
<tr>
<td>Sculpture</td>
<td>76</td>
<td>17</td>
<td>5</td>
<td>4</td>
<td>34.2</td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>44</td>
<td>49</td>
<td>68</td>
<td>30.2</td>
</tr>
</tbody>
</table>
drawn and their full-texts were checked to determine whether they were scholarly or non-scholarly sources (Table 6). All Adaptation players’ research paper sources were analyzed, but random samples of sources from other classes were drawn due to time and resource constraints (i.e., 40% of Adaptation nonplayers’ research paper sources, 30% of both Election players and nonplayers research paper sources, 25% of Sculpture players’ research paper and 40% of Sculpture partial players’ research paper sources). Characteristic of scholarly formats were books, conference proceedings, licensed encyclopedias and dictionaries, research reports, scholarly journals, and trade journals; characteristic of non-scholarly formats were blogs, consumer magazines, consumer newspapers, open web encyclopedias and dictionaries, policy statements, promotional material, public affairs information, trade magazines, and trade newspapers.

Table 6: Citing Scholarly and Non-Scholarly Sources in Research Papers

<table>
<thead>
<tr>
<th>Classes</th>
<th>Players % of scholarly sources</th>
<th>Nonplayers % of scholarly sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation</td>
<td>44.6</td>
<td>35.3</td>
</tr>
<tr>
<td>Election</td>
<td>47.2</td>
<td>44.7</td>
</tr>
<tr>
<td>Sculpture</td>
<td>45.0</td>
<td>42.8</td>
</tr>
</tbody>
</table>

Except for Adaptation nonplayers, about 45% of the sources students cited in their research papers were scholarly. Scholarly journals dominated scholarly formats, and consumer magazines and consumer newspapers dominated non-scholarly formats. Why Adaptation nonplayers were prone to citing non-scholarly formats is a mystery. Climate change is a mature topic that scientists and scholars have studied across several disciplines for several decades so there were plenty of scholarly sources available online. One might expect non-scholarly formats to prevail for the Election topic because of the newness of social media and the time it takes to conduct research and publish results in the scholarly press but they did not.

9 Discussion

This study’s analyses yielded mixed results. With regard to identifying one’s research topic, synchronization between the various steps of the research process and related assignments really mattered. BiblioBouts sources were hardly useful to Sculpture students because they were completing an assignment just as BiblioBouts began that not only set their paper’s topic, but also its direction and content. Adaptation and Election players were more likely than Sculpture players to identify their paper’s topic while playing BiblioBouts because their paper was due long after game play ended.

Whether players cited fellow players’ sources in their research papers depended upon the characteristics of the broad-based topics instructors assigned their students. The reason why Election players cited sources that other players contributed to the game in their research papers was this topic’s timely, trendy, and current nature. The topic was the subject of publications oriented to the general public that were available on the open web or in general-interest databases. Not enough time had passed for a scholarly tradition to develop around the Election topic. Additionally, its depth was limited so students were less likely to specialize, submitting sources that were too narrow to be useful for others. In contrast, the Adaptation and Sculpture topics required players to specialize, choosing a particular population and sculpture, respectively. As a result, Adaptation and Sculpture players disregarded sources that covered populations or sculptures other than those that interested them.

Some instructors had difficulty with BiblioBouts “one broad-based topic fits all” requirement. They did not want to read dozens of papers on the same topic so they introduced various workarounds. One workaround was splitting the class into smaller groups and assigning each group a different topic and its own game; unfortunately, when several group members dropped the course and/or failed to play up to expectations, there were too few sources, evaluations, and players for game play to be competitive. Another workaround was the topic specialization that characterized the Adaptation and Sculpture games; unfortunately, players from these games did not cite other players’ sources because they were either too general or too specific.

The Election topic was just right for the BiblioBouts game. Being a new topic, it did not have the depth that other topics had, and thus, Election students could use a wide array of sources even if they focused on a particular aspect of the election such as a particular political party, social media product, or candidate. Finding a broad-based topic that is new and does not have the depth that characterizes more established topics may be the key to defining topics for BiblioBouts and collaborative bibliography building generally so that students are able to find relevant sources amongst their classmates’ sources.

Engaging in collaborative bibliography reduced the usual procrastination that accompanies the research paper assignment. The majority of Adaptation (57.1%) and
Election (62.5%) players had selected or were close to selecting their research paper topic’s at the end of the BiblioBouts game (Table 2). Also Election and Sculpture players had in hand between one third and almost one half of the sources they would cite in their research papers (Table 4).

Collaborative bibliography building exposed students to many more sources than they would have found on their own. As a result, players cited more sources in their research papers than nonplayers. In focus groups, players described this and these other benefits of the sources they encountered during game play: impacting their paper’s topic, finding relevant sources, evaluating sources, and recognizing qualitative distinctions between open web and licensed sources:

- “I feel like the bibliography in a paper is something that is the most rushed and least cared about thing … Having this game even before the paper was due [made] you pay more attention to it and make you have a better bibliography because you would pay more attention to it and kind of give it the attention that it deserves before you even start the paper.”
- “When I found articles from BiblioBouts and I was like, ‘Oh, my gosh, this is amazing.’ It made me really happy when I found information that I didn’t [find on my own] and I’m like, ‘I’m going to use this. This is great.’ … This game made finding sources so much easier for me.”
- “The sources … actually helped narrow down my topic because I was like starting to like read some of the articles and sources so it like helped like kind of give direction to like my paper and like to help like specify what topics I wanted to go into.”
- “I read articles that I didn’t even think of, and it changed the direction of my paper.”
- “When you find the best sources and people vote on them, it helps you determine whether the sources you found are credible and what other people think about them.”
- “[Playing BiblioBouts] made me use the library more to find sources. And now I use Zotero for all of my projects and all of my papers when I need to find different articles.”

While collaborative bibliography exposed students to more sources than they found on their own, it did not necessarily result in them citing more scholarly than non-scholarly sources. Perhaps they considered scholarly sources too advanced, dismissing them due to their inability to fully understand them and integrate them with the other sources they had in hand. Supporting this explanation is Rebecca Jackson36, who suggests that what holds students back is not inadequate information literacy skills but their levels of cognitive development.

This study’s data and analyses provided evidence of the benefits students received as a result of collaborative bibliography building that was driven by an online game’s social media aspect. Students engaged in collaborative bibliography as a result of playing the information literacy game, and thus, games have great potential for hosting collaborative bibliography with a social media aspect.

Another approach would be the enhancement of citation management systems. They already have much of the functionality for collaborative bibliography building. They would have to be enhanced with a social media aspect that gives students tools to rate their classmates’ sources. Gamification may be necessary to infuse collaborative bibliography with a competitive aspect to stimulate student interest and boost their participation. Citation management systems would also benefit from the automatic enrollment functionality that is inherent to course management systems. Then invitations to a collaborative bibliography building event would be automatic, issued by the citation management system instead of manually by instructors entering individual student names and email addresses into an event roster. Course management systems could be used to log and generate reports of player participation to instructors for grading. Overall, there is much potential for collaborative bibliography building with a social media aspect at the intersection of both citation and course management systems.

### 10 Summary

The purpose of this paper was to determine whether the social media aspect of collaborative bibliography building benefited students tasked with finding information for their research papers. To achieve this purpose, it studies students who played an information literacy game that used social media to facilitate collaborative bibliography building. Investigated are several research questions that probed students’ research paper topics and the sources players encountered during game play. Game logs were analyzed to answer the questions and player responses to focus group interviews were used to gain greater understanding of logged quantitative data. Although results

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were mixed, players benefited as a result of the social media aspect of collaborative bibliography building. They encountered many more sources than they would have encountered on their own; however, citing these sources depended upon various characteristics of the broad-based topic in play and the extent of synchronization between the game’s bibliography building activities and related student assignments. After some initial indecision about their research paper’s topic, most players identified their topic while participating in bibliography building activities. The study concludes with practical suggestions about the types of systems that would be conducive to collaborative bibliography building and how they would have to be enhanced to enable a social media aspect.

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