Building the Games Students Want to Play: BiblioBouts Project Interim Report #5

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Abstract

The University of Michigan's School of Information and its partner, the Center for History and New Media at George Mason University, have undertaken the 4-year BiblioBouts Project (October 1, 2008 to September 30, 2012) to support the design, development, testing, and evaluation of the web-based BiblioBouts game to teach incoming undergraduate students information literacy skills and concepts. This fifth interim report describes the BiblioBouts Project team's 12-month progress achieving the project's 4 objectives: designing, developing, deploying, and evaluating the BiblioBouts game and recommending best practices for future information literacy games. This latest 12-month period was marked by extensive progress in the analysis of evaluation data from the testing of the beta 1.0 version of BiblioBouts and putting to work what was learned from this analysis in the design and development of the beta 2.0 version of BiblioBouts. Major tasks that will occupy the team for the next 12 months are demonstrating BiblioBouts' learning goals, recruiting more instructors to incorporate BiblioBouts in their classes, seeking additional funding, and finding a future home for BiblioBouts. For additional information about game design, pedagogical goals, scoring, game play, project participants, and playing BiblioBouts in your course, consult the BiblioBouts Project web site (http://bibliobouts.si.umich.edu).

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Building the Games Students Want to Play: BiblioBouts Project Interim Report #5

1 Project Objectives

The BiblioBouts Project has the following four objectives:

1. Design and develop a game that teaches students information literacy skills and concepts while they do their assigned coursework.
2. Evaluate the game to determine its effectiveness for teaching information literacy skills and concepts.
3. Expand our list of premises for the design of information literacy games to give direction to future designers.
4. Develop a model of best practices for the design, development, and deployment of information literacy games so that institutions that want to pursue game development can streamline their efforts.

During the last 12 months of the project (October 2010 to September 2011), the BiblioBouts Project team has been hard at work on achieving all project objectives. In fall 2010, the BiblioBouts Project team completed the design and development of the beta 1.0 version of BiblioBouts. From January 2011 through August 2011, the beta 1.0 version of BiblioBouts has been available to instructors at both participating and non-participating institutions for their students to play. At the former, the BiblioBouts Project team and library liaisons collaborate in the collection of evaluation data. At the latter, the BiblioBouts Project team conducts post-game interviews with instructors. Team members use evaluation results to achieve these four goals: (1) to improve the game so it had the functionality students wanted, (2) to demonstrate the game's learning gains so more instructors will incorporate the game into their classes, (3) to expand our list of premises for the design of information literacy games so that future designers can benefit from our experience, and (4) to develop a model of best practices for the design, development, and deployment of information literacy games so that institutions that want to pursue game development can streamline their efforts.

2 Project Design

Table 1 enumerates the 12 design steps of the BiblioBouts Project. It includes the people responsible for and the original and actual dates of the work effort. To date, the BiblioBouts Project team has made progress on all design steps 1–12. These 12 steps are the organizing principle for this fifth interim report.

Table 1. 12 Design Steps of the BiblioBouts Project

Step	Original date	Actual date	Responsibility
1. Design and develop the alpha version of BiblioBouts	fall 2008, winter, & spring 2009	fall 2008, winter spring, & summer 2009	Project team

Step	Original date	Actual date	Responsibility
2. Learn about the research needs of incoming students	fall 2008	summer 2009	Principal Investigator (PI), Co-PIs, student assistants; instructors at participating institutions
3. Conduct baseline study #1	summer 2008	fall 2009	PI, Co-PIs, student assistants
4. Test the alpha version of BiblioBouts	summer 2009 & winter 2010	fall 2009 & winter 2010	Project team; project liaisons, students, and instructors at participating institutions
5. Evaluate game play (alpha version of BiblioBouts)	fall 2009 & winter 2010	fall 2009 & winter 2010	PI, Co-PIs, student assistants, instructors and students at participating institutions
6. Analyze evaluation data and report findings I	spring & summer 2010	winter, spring, & summer 2010	PI, Co-PIs, student assistants
7. Design and develop the beta 1.0 version of BiblioBouts	winter 2010, spring, & summer 2010	spring, summer, & fall 2010	Project team
8. Conduct baseline study #2	fall 2010	fall 2010 & winter 2011	PI, Co-PIs, student assistants, project liaisons at participating institutions
9. Test the beta 1.0 version of BiblioBouts	summer & fall 2010	winter, spring, and summer 2011	Project team; project liaisons, students, and instructors at participating institutions
10. Evaluate game play (beta 1.0 version of BiblioBouts)	summer & fall 2010	winter, spring, and summer 2011	PI, Co-PIs, student assistants; project liaisons, students and instructors at participating institutions
11. Analyze evaluation data and report findings II	winter, spring, & summer 2011	spring & summer 2011	PI, Co-PIs, student assistants
12. Support widespread distribution and adoption of the beta 2.0 version of BiblioBouts	winter, summer, & fall 2011	fall 2011, winter, spring, & summer 2012	Project team, library liaisons

3 Design and Develop the Alpha Version of BiblioBouts (Step 1)

(The BiblioBouts Project team finished this step in fall 2009. See Interim Report #3 for a full discussion.)

4 Learn About the Research Needs of Incoming Students (Step 2)

(The BiblioBouts Project team finished this step in summer 2009. See Interim Report #2 for a full discussion.)

5 Conduct Baseline Study #1 (Step 3)

(The BiblioBouts Project team finished this step in fall 2009. See Interim Report #4 for a full discussion.)

6 Test BiblioBouts I (Step 4)

(The BiblioBouts Project team finished this step in spring 2010. See Interim Report #3 for a full discussion.)

7 Evaluate Game Play I (Step 5)

(The BiblioBouts Project team finished this step in winter 2010. See Interim Report #4 for a full discussion.)

8 Analyze Evaluation Data & Report Findings I (Step 6)

(The BiblioBouts Project team finished this step in summer 2010. See Interim Report #4 for a full discussion.)

9 Design and Develop the Beta 1.0 Version of BiblioBouts (Step 7)

Based on the BiblioBouts Project team's analysis of evaluation data, the team redesigned and enhanced BiblioBouts in spring, summer, and fall of 2010. Interim Report #4 described major changes between BiblioBouts' alpha and beta 1.0 versions. Some desired changes were not implemented because they could not be finished in time for new classes to begin playing the game in January 2011. Table 2 describes these changes and organizes them according to the bout or the player's home page. At the conclusion of the next BiblioBouts testing and evaluation cycle, the BiblioBouts Project team revisited this list first to determine whether development of these unimplemented changes was warranted for BiblioBouts' beta 2.0 version (see also Step 12).

Table 2. Unimplemented Changes to the Beta 1.0 Version of BiblioBouts

Bout or home page	Unimplemented change
Player's home page	Awarding of badges for meritorious game play
	Adding a scoring log
Player's home page and all bout pages	Displaying badges with earned badges highlighted and unearned badges greyed out
Donor bout	Listing databases from which fellow game players are donating sources
	Listing keywords (designated as "tags") that are frequently-occurring index terms in donated citations
Closer bout	Displaying citations in the MLA format
Tagging & Rating bout	On the feedback page, including badges earned by the player whose ratings and comments are displayed
Best Bibliography bout	Searching sources by big idea
	Sorting sources by source donor (oneself or someone else)

Bout or home page	Unimplemented change
	Adding most-frequently chosen format and publisher tag to the "Show Content" display
Post-Game Library	(Same as Best Bibliography bout above)

10 Conduct Baseline Study #2 (Step 8)

The project's initial baseline studies were conceived during the project proposal phase of the project (fall 2007). Since that time, the BiblioBouts Project team has arrived at more efficient ways of generating baseline data for the purpose of making comparisons the performance of non-players and players. The comparisons enable us to answer the research question "Is gaming an effective approach for teaching incoming undergraduate students information literacy skills?"

The BiblioBouts Project team generated baseline data for the evaluation from the game's log of all player activity including whether a player played the bout, failed to meet, met, or exceeded the bout's cap or quota. Using these data, team members divide players into two groups: (1) players who played all bouts and met or exceeded all bout's caps and quotas and (2) non-players who failed to play one or more bouts or failed to meet one or more bouts' caps or quotas. BiblioBouts Project team members use the Five-Faceted Taxonomy for Classifying Citations to Digital Information to analyze the quality of sources players and non-players cite in their final papers and compare the results. (See Step 11 for more detail.)

11 Test the Beta 1.0 Version of BiblioBouts (Step 9)

To recruit instructors to adopt BiblioBouts in their classes, BiblioBouts Project team members encouraged them to email us with their questions and concerns, arranged to demonstrate BiblioBouts to them in person or via Webex conferences, and helped them synchronize their course syllabi with the four bouts of BiblioBouts. Table 3 lists classes where the beta 1.0 version of BiblioBouts was tested from winter 2011 to summer 2011. A total of 9 different instructors deployed BiblioBouts in 11 classes. About half of the classes were English classes.

Of the 264 students who registered for a BiblioBouts account, 78.0% completed three or four of the game's four bouts.

Institution	Class	# Reg.	Completion rate	Semester
Portland State U.	Information literacy	31	87.1	Winter 2011
Troy U.	English	17	58.8	Winter 2011
Troy U.	English	42	66.7	Winter 2011
U. of Calif., Irvine	Humanities	22	72.7	Winter 2011
U. of Michigan	English	47	78.7	Winter 2011
U. of Michigan	English	19	100.0	Winter 2011
U. of Michigan	English	19	84.2	Winter 2011
U. of Michigan	Global scholars program	19	73.7	Winter 2011

Institution	Class	# Reg.	Completion rate	Semester
Wayne State U.	Library science	22	86.4	Winter 2011
Wayne State U.	Library science	6	50.0	Summer 2011
Youngstown State U.	English	20	85.0	Summer 2011
Total	NA	264	78.0	NA

12 Evaluate Game Play (Beta 1.0 Version of BiblioBouts) (Step 10)

Two of the six institutions listed in Table 3 were participants in the formal evaluation of BiblioBouts (Troy and Michigan). At these institutions, the BiblioBouts Project team could enlist up to 7 data collection methods to evaluate BiblioBouts because they had certification from the institution's human-subjects review board. At the remaining institutions, we could only conduct pre- and post-game interviews with instructors using certification from the human-subjects review board at the University of Michigan. To evaluate the beta 1.0 version of BiblioBouts, the BiblioBouts Project team used focus group interviews (students), pre- and post-game questionnaires (students), game-play logs (students), and post-game personal interviews (instructors).

13 Analyze Evaluation Data and Report Findings II (Step 11)

Two important goals drive the BiblioBouts Project team's analysis of evaluation data: (1) improving the game so it had the functionality students wanted and (2) demonstrating the game's learning gains so more instructors will incorporate the game into their classes. Publicity and published papers detail evaluation results.

13.1 Publicity Efforts

Table 4 lists the BiblioBouts Project team's deliberate publicity efforts this year. In advance of most events, we submitted proposals that received acceptances from conference, editorial, or program committees.

Table 4. BiblioBouts Project Team's Publicity Efforts

Type	Date	Notes
Conference presentation	2011 October	At the 2011 EDUCAUSE annual conference in Philadelphia, co-PI Vic Rosenberg and GSRA Chris Leeder present "Using the Online BiblioBouts Game to Teach Information Literacy in Academic Classes."
Poster	2011 June	At the 2011 American Library Association annual meeting in New Orleans, PI Karen Markey and Library Liaisons Catherine Johnson and Alyssa Martin present the poster "The Plug-and-Play Potential of the BiblioBouts Information Literacy Game" at the ALA Poster Sessions.
Poster	2011 June	At the 2011 American Library Association annual meeting in New Orleans, PI Karen Markey and Library Liaisons Catherine Johnson and Alyssa Martin present the poster "BiblioBouts: The Information Literacy Game Students Want to Play" at the ALA Instruction Section Program.
Poster	2011 June	At the Games+Learning+Society Conference in Madison, Wisc.,

Type	Date	Notes
		GSRA Chris Leeder presents the poster "Engagement and Gamification in an Online Learning Game"
Demonstration	2011 March	At ACRL 2011 in Philadelphia, GSRA Chris Leeder presents "BiblioBouts: Online social gaming for developing information literacy skills and concepts" at the Cyber Zed Shed.
Conference presentation	2011 February	PI Karen Markey presents the session "The Plug-and-Play Potential of Online Games for Teaching Students Library Research Skills and Concepts" at the First-Year Experience national conference on February 7 in Atlanta, Ga.
Press release	2011 January	The University of Michigan (U-M) issues a press release describing BiblioBouts' availability.
Demonstration	2010 October	GSRA Chris Leeder presents the poster "Testing an Online Game to Teach Academic Research Skills" to conference attendees at Meaningful Play 2010 in Lansing, Mich.

The U-M issued a press release on January 11, 2011 describing the BiblioBouts game. As a result, many outlets publicized BiblioBouts, conducted follow-up interviews with BiblioBouts Project team members including library liaisons bout their experience playing the demo BiblioBouts game, and/or culled additional information from the BiblioBouts Project web site (http:bibliobouts.si.umich.edu/). This year's external publicity on the BiblioBouts information literacy game is listed in Table 5.

Table 5. Media Outlets Publicizing BiblioBouts

Type	Date	Notes
Blog posting	2011 April	Michael O'Brien blogs about BiblioBouts in his posting "Research Skills: The Video Game" on Games Can Teach.
Online newsletter	2011 February	The Big Deal Book of Technology describes BiblioBouts and links to the demo game.
Blog posting	2011 February	Liz Danforth's blog entitled "Games, Gamers, & Gaming: Gamification of Libraries" in LibraryJournal.com includes BiblioBouts.
Blog posting	2011 February	Frank Baker blogs on "BiblioBouts, an Online Sourcing Game for Academia that Offers Lessons on Media Literacy in NCTE Media Blog.
Blog posting	2011 February	Chris Meadows blogs on "BiblioBouts Game Teaches Lessons in Source Credibility" in TeleRead.
Blog posting	2011 February	Library liaison Catherine Johnson blogs on "BiblioBouts: A Research Game for Students" in Library Tech Talk and Academia.edu.
Interview and follow-up blog posting	2011 January and February	After interviewing BiblioBouts' principal investigator, interviewer Justin Ellis at the Nieman Journalism Lab speculates on the BiblioBouts' architecture as the underlying architecture for a media literacy game.
Blog posting	2011 January	Gabe Newell blogs about BiblioBouts in his posting "Teaching Students Scholarly Research with a Video Game" on Game Politics.com.
Blog posting	2011 January	Erin Anderson blogs on "BiblioBouts: An Online Game that Teaches Citation Skills" in Erin Anderson: A Newbie Librarian's Space Online.

Type	Date	Notes
Blog posting	2011 January	Kristin Fontichiaro blogs on "BiblioBouts: Making Deep Reading and Great Sources a Game" in Library Unlimited's School Library Monthly.
Blog posting	2011 January	Alexis Mattera blogs on "Ready, Set, BiblioBout! New Online Program Makes Bibliography Building Easier, Even Enjoyable" on Scholarships.com.
Local news web site	2011 January	Alex Roush reports on BiblioBouts in his article "New UM Online Game Teaches Scholarly Research Skills to Undergrads" for CBS Detroit.
Interview and follow-up online news article	2011 January	Chronicle of Higher Education reporter interviews BiblioBouts' principal investigator and writes about the game in "Online Game Teaches Citation Skills" in the *Chronicle of Higher Education: Wired Campus Blog*, January 7, 2011.

13.2 Publishing Scholarly Papers

Publishing scholarly papers that result from the BiblioBouts Project team's analysis of evaluation data is an important priority. Methods that have been fruitful with regard to providing evidence of the learning gains and benefits of playing BiblioBouts are pre- and post-game questionnaires, focus group interviews, and game log data. Questionnaires yield players' responses to questions about their perceptions of conducting certain library research tasks before and after they play the game. In focus group interviews, players describe in detail what they learned as a result of playing the game. From game logs, project team members extract the sources players chose at the beginning and end of the game and apply the Five-Faceted Taxonomy for Classifying Citations to Digital Information to determine whether their quality improves. Table 6 lists the papers we have drafted and/or submitted for publication in scholarly journals this year.

Table 6. Papers Published or In Progress

Status	Title/Publisher	Description
In press	"BiblioBouts: What's in the Game?"/College & Research Libraries News	How to play the game, instructor responsibilities, benefits of playing the game.
In press	"A Faceted Taxonomy for Rating Student Bibliographies from an Online Information Literacy Game"/College & Research Libraries	The development and testing of the Five-Faceted Taxonomy for Classifying Citations to Digital Information.
2011	"The Effect of Scoring and Feedback Mechanisms in an Educational Game"/ASIS&T Proceedings	The impact of scoring and feedback on students' game play.
In review	"Through a Game Darkly: Students' Experiences with the Technology of the Library Research Process"	Reveals the difficulties of the library research process that are rooted in technology and how playing BiblioBouts can help students overcome them.
Manuscript	"How Students Play an Online Information Literacy Game"	How students play the game helps system designers improve it and instructors plan for the demands it places on their students.

Status	Title/Publisher	Description
Manuscript	"Does the BiblioBouts Information Literacy Game Improve the Quality of the Sources Students Cite in their Papers?"	Research that examines whether the quality of the sources students cite in their final papers improves as a result of playing BiblioBouts.

13.3 Improving BiblioBouts

The BiblioBouts Project team has put system design and development at the fore so that instructors who incorporate the game into the classes can be assured that their students benefit from playing the BiblioBouts game. Design and development has been driven by the evaluations of the alpha version of BiblioBouts in 2010 and the beta 1.0 version of BiblioBouts in 2011. Making the most recent improvements involved findings from the latter and prioritizing unimplemented changes from the former (see also Table 2).

When the beta 2.0 version of BiblioBouts debuts in fall 2011, these major changes will have been implemented into this version:

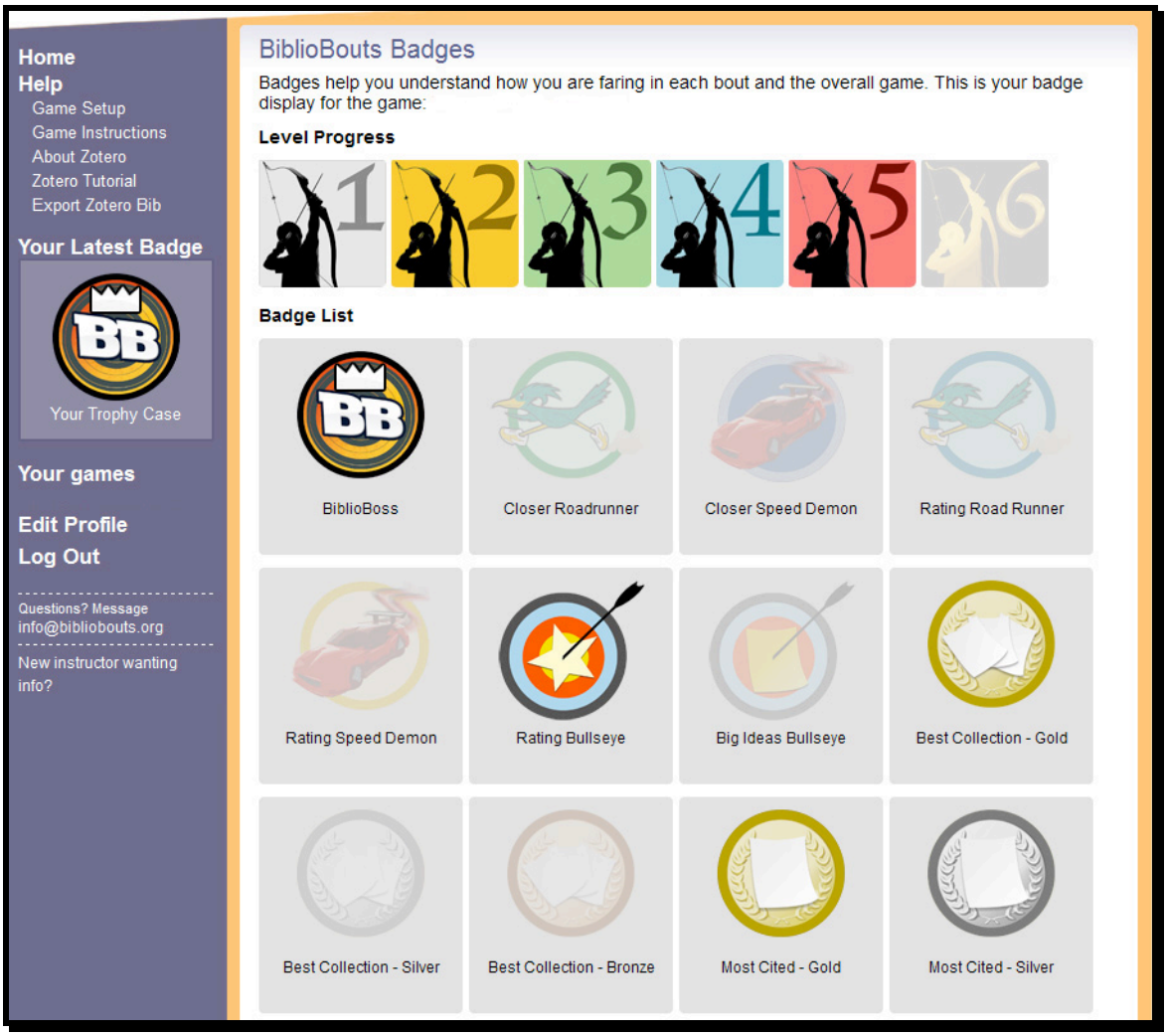
- **Stripping the Donor bout from BiblioBouts.** Because players reported problems saving and sharing their sources between Zotero and BiblioBouts, the Donor bout has been stripped from BiblioBouts. Now players use Zotero apart from BiblioBouts, signing onto the game when they have registered in Zotero and saved a minimum number of sources (prescribed by their instructors) in Zotero. Such a change enables BiblioBouts technical staff to quickly diagnose problems and focus game play on BiblioBouts—evaluating sources, generating a topic for one's paper, and choosing the best sources to write the paper. It also prepares us to expand BiblioBouts beyond Zotero for source submission, for example, allowing players to use comparable citation managers such as EndNote, RefWorks, Papers, Mendeley, etc.
- **Improvements to the game's scoring algorithm.** Evaluation results demonstrated that players who exceeded the Tagging & Rating bout's quota built such an insurmountable lead that their opponents lost hope of winning the game and dropped out. To revamp the game's scoring algorithm, the BiblioBouts Project team programmed an Excel spreadsheet to model the game-play styles of quota, above-average, and super players and used the spreadsheet to ensure that players whose game play was in keeping with these four scoring priorities would earn a spot high atop the leader board at the end of the game: (1) meeting the game's caps, (2) exceeding its quotas, (3) agreeing with their opponents' credibility and relevance ratings and content tags, and (4) being the first to close the sources that their opponents choose for their best bibliographies.
- **Badges.** Players win badges for meritorious game play. The game awards some badges only once, for example the "Eager Beaver" badges to the first players who score points in each of the three bouts. Players can "steal" other badges from their opponents. For example, the Cornucopia badge that a player earns for the greatest number of comments is awarded to the first player to enter a comment. When another player exceeds the number of comments entered by first player, s/he "steals" this badge away from the first player and keeps it until another "steals" it away from him. This adds more competition to the badges features and may even

reinforce desired behaviors.

- **Trophy case.** BiblioBouts features a trophy case where players can display their badges. Clicking on one's level badge in the navigation bar opens one's trophy case. Earned badges are highlighted and unearned badges are greyed out. Tagging and rating feedback also displays the rater's current level, badges, and leader board standing so that players can decide how seriously they want to consider the rater's evaluation.

  Figure 1 shows the trophy case of a player who has won a BiblioBouts game. She has achieved the 5th level, indicated by the five full-color levels badges. Included in her trophy case is the "BiblioBoss" badge for winning the BiblioBouts game and badges for the most cited collection of closed sources ("Best Collection – Gold" badge), most cited closed source ("Most Cited Source – Gold" badge), second most-cited closed source ("Most Cited Source – Silver" badge). She was also the most skillful rater winning the "Rating Bullseye" badge.

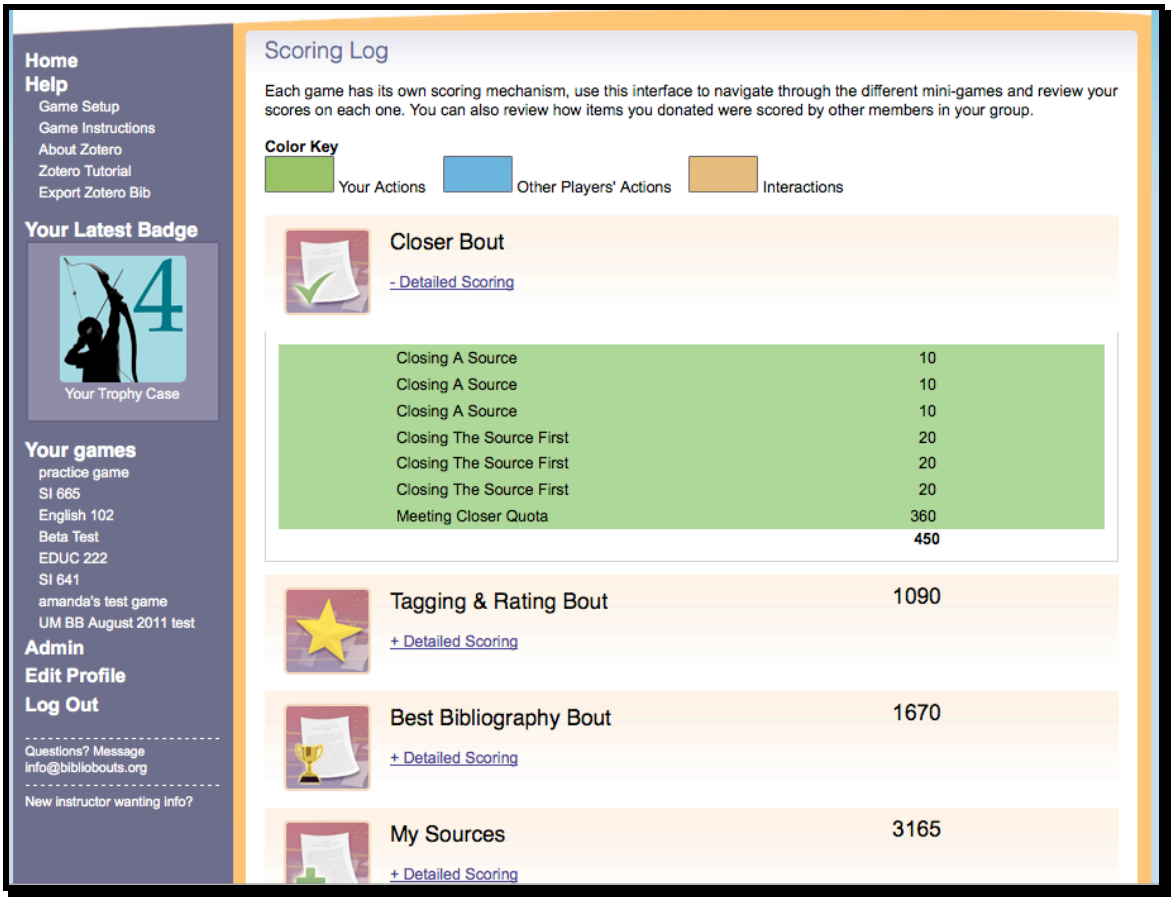
Figure 1. Example of a Winner's Trophy Case



- **Scoring log.** At any time, a player can display a detailed scoring log that

enumerates actions and interactions that scored points. The log categorizes points by bout (Closer, Tagging & Rating, and Best Bibliography) and sources. Clicking on the toggle (+Detailed Scoring) displays the log. In figure 2, detailed scoring for the Closer bout is toggled on. This player closed 3 sources earning 10 points per source and was the first player to close each of the 3 sources earning 20 points per source. Because he met his game's Closer cap, he earned 360 bonus points. All scoring events were the result of this player's actions, thus they are color coded green. Players can also earn points as a result of other players' actions (such as closing a source that opponents tag as a high-quality source) or interactions (such as approximating opponents' credibility and relevance ratings for a source).

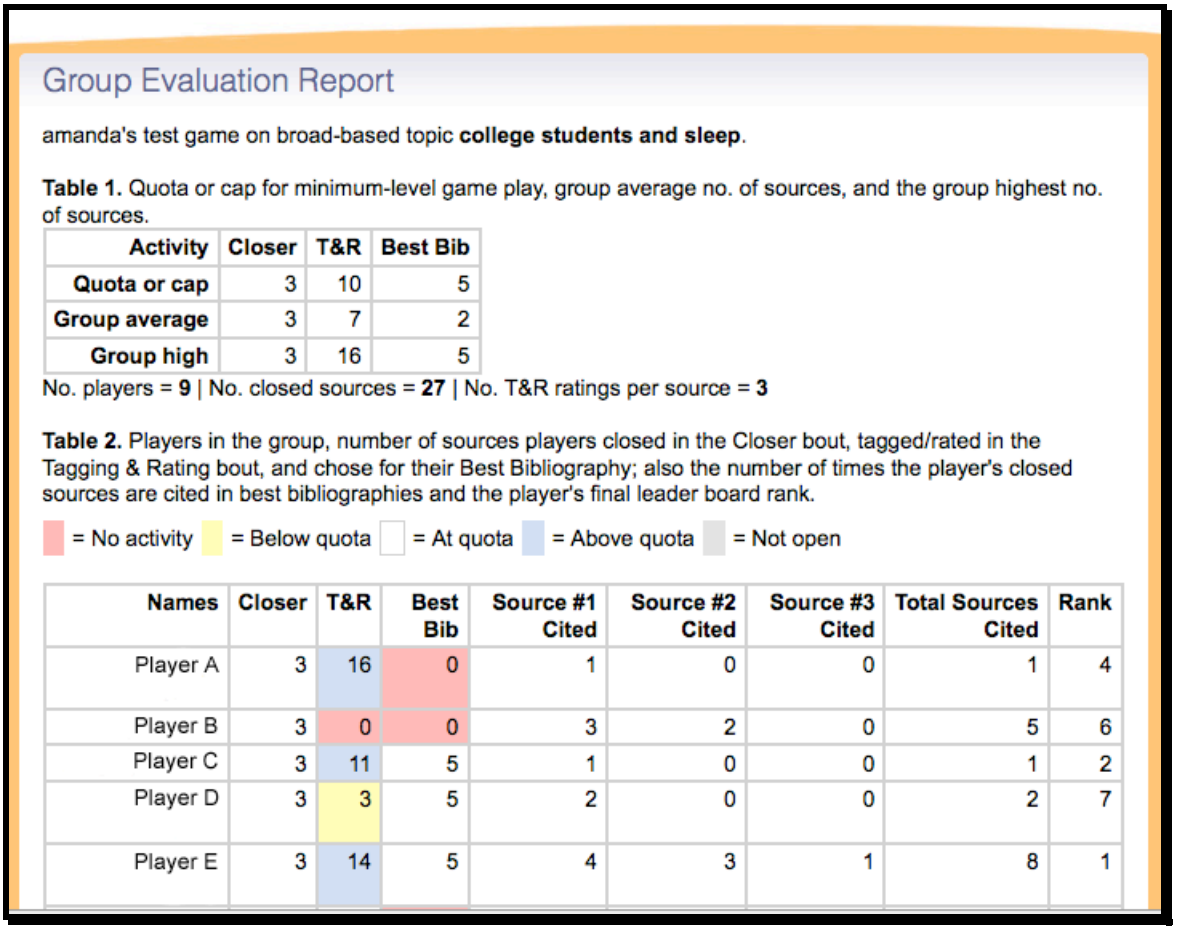
Figure 2. Scoring log with detail for the Closer bout revealed



- **Interface improvements.** We have made several interface improvements. Examples are "next source" and "previous source" buttons added to feedback displays so that players can review opponents' ratings and comments for all of their closed sources or all the sources they tagged and rated in one fell swoop. Frequently-assigned big ideas have been added to source records in the Best Bibliography bout and Post-Game Library.
- **Enhanced Evaluation Report for instructors.** In the administrative interface, instructors can monitor an Evaluation Report that details the extent of their students' participation in the game. Cited-sources data have been added to the

report, for example, the number of times one's opponents cited one's closed sources and the bonus points one earned as a result of one's opponents citing one's closed sources. Summary game data have also been added, for example, the number of players and closed sources that figured into the game.

Figure 3. Top half of the Evaluation Report for instructors



Group Evaluation Report

amanda's test game on broad-based topic **college students and sleep**.

Table 1. Quota or cap for minimum-level game play, group average no. of sources, and the group highest no. of sources.

Activity	Closer	T&R	Best Bib
Quota or cap	3	10	5
Group average	3	7	2
Group high	3	16	5

No. players = **9** | No. closed sources = **27** | No. T&R ratings per source = **3**

Table 2. Players in the group, number of sources players closed in the Closer bout, tagged/rated in the Tagging & Rating bout, and chose for their Best Bibliography; also the number of times the player's closed sources are cited in best bibliographies and the player's final leader board rank.

= No activity = Below quota = At quota = Above quota = Not open

Names	Closer	T&R	Best Bib	Source #1 Cited	Source #2 Cited	Source #3 Cited	Total Sources Cited	Rank
Player A	3	16	0	1	0	0	1	4
Player B	3	0	0	3	2	0	5	6
Player C	3	11	5	1	0	0	1	2
Player D	3	3	5	2	0	0	2	7
Player E	3	14	5	4	3	1	8	1

Figure 3 shows the top half of the Evaluation Report (player names have been anonymized by substituting the labels Player A, Player B, etc.). The Report's Table 1 displays summary data for this game such as caps and quotas for each bout, number of players, closed sources, and number of ratings that the Tagging & Rating bout collects per source. The Report's Table 2 displays player names, the number of sources they have examined during the bout, and uses color coding to indicate their progress toward meeting or exceeding each bout's cap or quota. It also details the number of times players' closed sources have been cited and their final rank in the game. Instructors can click on a link to display an Evaluation Report FAQ that explains this Report's data and gives them suggestions for grading students based on their game-play performance. They can also cut Evaluation Report data and paste them into a Google Docs spreadsheet to conduct analyses for grading or other purposes.

- **New game log for closed sources data.** At the bottom of the Evaluation Report are links to game-play data logs for each of the three bouts and to players' closed

sources. Clicking on the links download data logs that open into spreadsheet applications. The new Closed Sources data log records player names, topics, each player's closed sources, each source's URL (if available), citation, the number of times each source was cited by other players, and the credibility and relevance ratings other players gave to each source. The BiblioBouts Project team added the Closed Sources data log in response to an instructor who graded her students' game-play performance based on an analysis of their closed sources.

14 Support Widespread Distribution and Adoption of the Beta 2.0 Version of BiblioBouts (Step 12)

This section describes BiblioBouts' fully functional administrative interface for instructors and its fully functional game interface for players. Instructors who are interested in adopting BiblioBouts in their classes are encouraged to contact the BiblioBouts Project team at info@bibliobouts.org for more information and for administrative authorization that enables them to create and manage games.

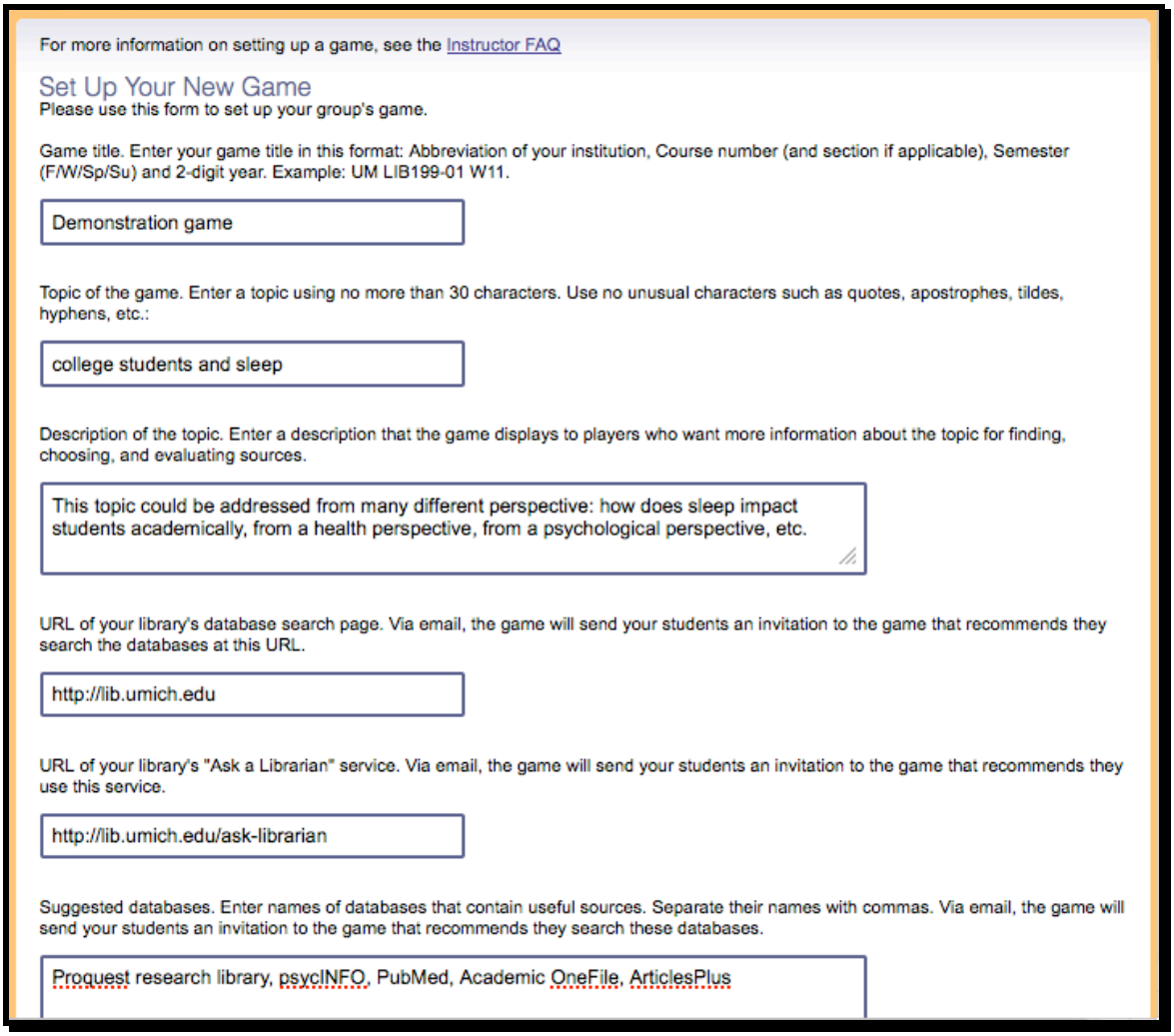
14.1 BiblioBouts' Fully-Functional Administrative Interface

BiblioBouts has a fully functional administrative interface for instructors to create games, monitor their students' game-play activity, and copy game-play statistics into spreadsheets so they can grade students' game-play performance. To gain access to the BiblioBouts administrative interface, instructors first register in BiblioBouts, then contact the BiblioBouts Project team, identifying themselves as instructors and asking for an administrative account. Once granted access, instructors sign onto BiblioBouts and click on the "Admin" link on the navigation bar to enter the administrative interface where they can create new games, edit existing ones, or check their students' game-play activity in ongoing and/or finished games.

14.1.1 Creating Games

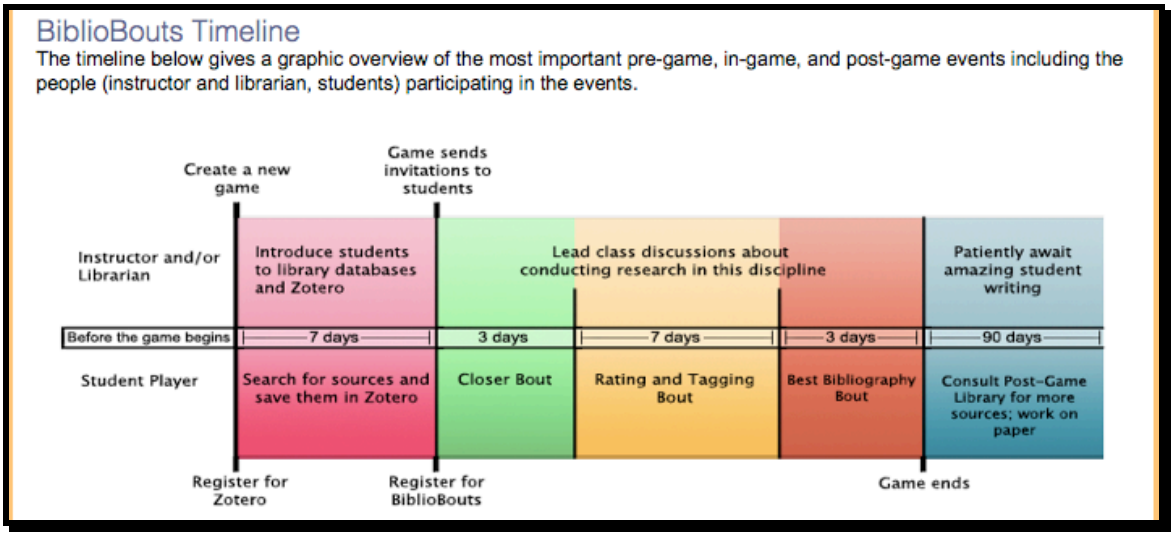
Clicking on the "Create New Game" link on the administrative interface's navigation bar produces a form that instructors complete to create a new game. Figure 4 shows the top portion of the form where instructors enter the game's title, topic, description, etc. Scrolling down would reveal more dialogue boxes into which instructors enter suggested keywords and phrases and students' email addresses. BiblioBouts uses the information instructors type into this portion of the form and the schedule that concludes the form to automatically message students about the game and give them suggestions about what databases and keywords to search, a link to their institution's database portal, and a link to their library's ask-a-librarian service.

Figure 4. Creating a new game form: Titles, topics, and other basic information



Scrolling down reveals the BiblioBouts Timeline that shows pre-game, in-game, and post-game events graphically (figure 5). The form advises instructors to consult the Timeline to set up their new game's timetable and to synchronize their syllabus and assignment to BiblioBouts.

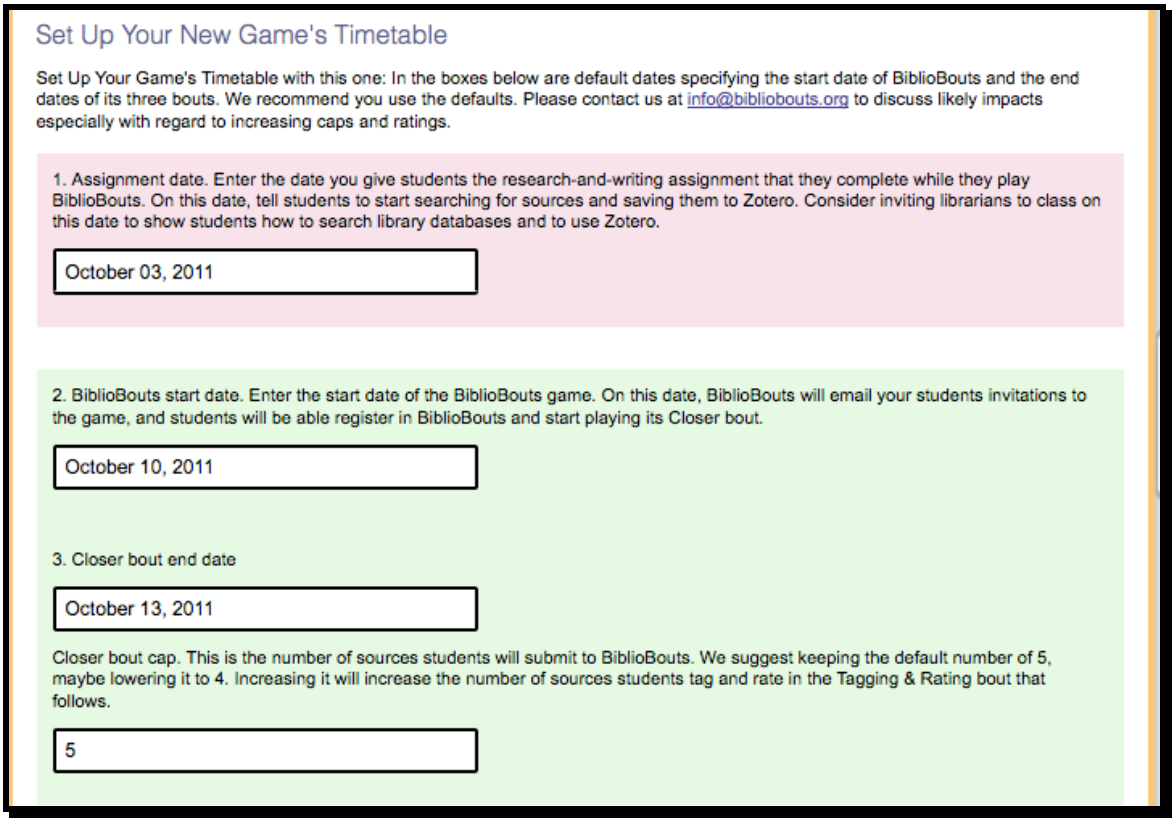
Figure 5. BiblioBouts Timeline



Below the BiblioBouts Timeline are instructions for scheduling one's BiblioBouts game and dialogue boxes into which instructors enter beginning and end dates for their game's three bouts (figure 6). Instructors also enter their game's caps and quotas; caps and quotas represent their minimum-level expectations for the effort their students put into the game. Instructors can accept the game's default values or override them with their own values. Instructions advise instructors on the consequences of increasing and decreasing default values.

In figure 6, instructors start by setting the assignment date. This is the date on which BiblioBouts automatically messages students announcing the game, suggesting relevant keywords and databases they should search, and giving links to their institution's database portal and library's ask-a-librarian service for assistance. Next comes the start and end dates and the cap for the Closer bout. Instructors can override default values and enter their own. Scrolling down would reveal dates for starting and ending the game's two remaining bouts and default values for these bouts' caps and quotas. When the final bout ends, BiblioBouts transitions to the Post-Game Library which remains open to all registered players for three months after their game ends.

Figure 6. Creating a new game form:
Scheduling bouts and setting caps and quotas



14.1.2 Monitoring Students' Game Play and Grading Them

BiblioBouts' fully functional administrative interface gives tools to instructors that they can use to monitor student activity during game play and evaluate student activity after their games end. To access these tools, instructors sign onto BiblioBouts and click on the Admin link in the navigation bar to:

- Edit their games' starting and ending dates
- Add or remove players from a game
- Create a news item that players see upon logging into the game
- Display an Evaluation Report bearing game-play statistics that instructors can cut-and-paste into spreadsheet applications for their own analyses including grading students based on their game-play performance.

The Evaluation Report features four tables bearing these game data:

- Table 1: Summary statistics for the game such as the number of players, quotas and caps for minimum-level game play, group average number of sources, and the group highest number of sources.
- Table 2: Game players' progress toward meeting each bout's cap or quota, the number of times each player's closed sources are cited in best bibliographies, and their rank on the leader board

- Table 3: Summary scoring statistics for the game such as average scores and high scores per bout
- Table 4: A breakdown of each player's score and their rank on the leader board

Figure 3 shows Tables 1 and 2 from the Evaluation Report. Accompanying the Evaluation Report is an Evaluation Report FAQ that explains the Report's data tables and suggests how instructors can use the data to grade their students' game-play performance. Instructors can cut-and-paste table data into Google Doc spreadsheets.

At the bottom of the Evaluation Report are links to game-play data logs for each of the three bouts and to players' closed sources. Clicking on the links download data logs that open into spreadsheet applications. The BiblioBouts Project team uses the data logs to answer research questions for the evaluation phase of the project; however, instructors also have access to these data logs and one in particular used the Closed Sources Log to grade her students' game-play performance.

14.2 BiblioBouts' Fully-Functional Game Interface

BiblioBouts is now a fully functional information literacy game that ushers students through the research process while they complete an assignment. Game play guarantees that students use professional information-seeking tools such as the library portal, scholarly databases, and citation management software, they are exposed to more sources than they would find on their own, and they get valuable experience evaluating sources so that they know the right questions to ask and answer the next time they have to evaluate the sources for an academic assignment. BiblioBouts' game-like features such as levels, leader board, and badges make the game fun and engaging.

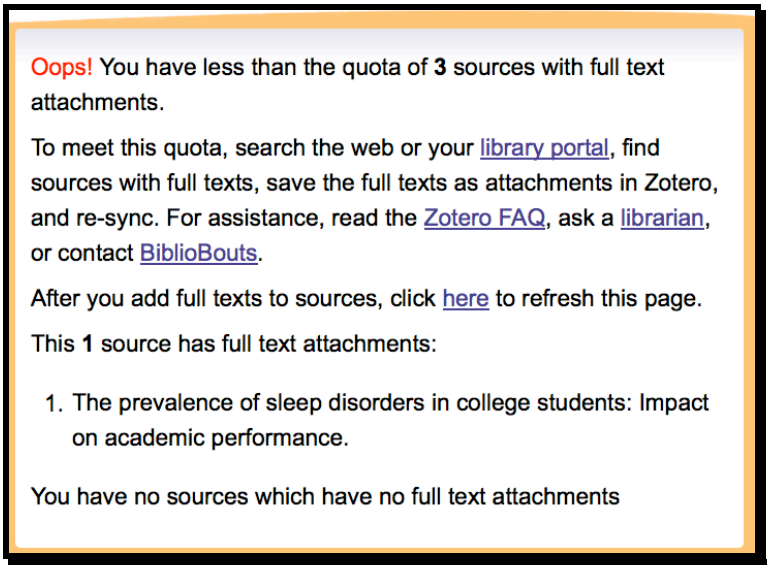
This section tours the BiblioBouts game interface. Interested readers can also familiarize themselves with BiblioBouts by playing the demonstration game at http://bibliobouts.org and entering "demo@bibliobouts.org" (minus the quotes) for "Email" and "demo" (minus the quotes) for "Password."

14.2.1 Pre-Game Activity

BiblioBouts expects students to find sources on the broad-based topic and use Zotero to save these sources in the form of online citations and full-texts. How many sources students are required to find and save using Zotero is determined by instructors when they set the cap for the Closer bout.

To play BiblioBouts, students must first register for a BiblioBouts account. When they log onto the game for the first time, BiblioBouts tells students who have met or exceeded the Closer cap that they are cleared to play the Closer bout. BiblioBouts tells students who have not met the Closer cap that they cannot play BiblioBouts until they search online for more sources and use Zotero to save them. This is the case in figure 7 in which the player has prematurely signed onto BiblioBouts, that is, before he or she has the quota of three sources with full-text attachments.

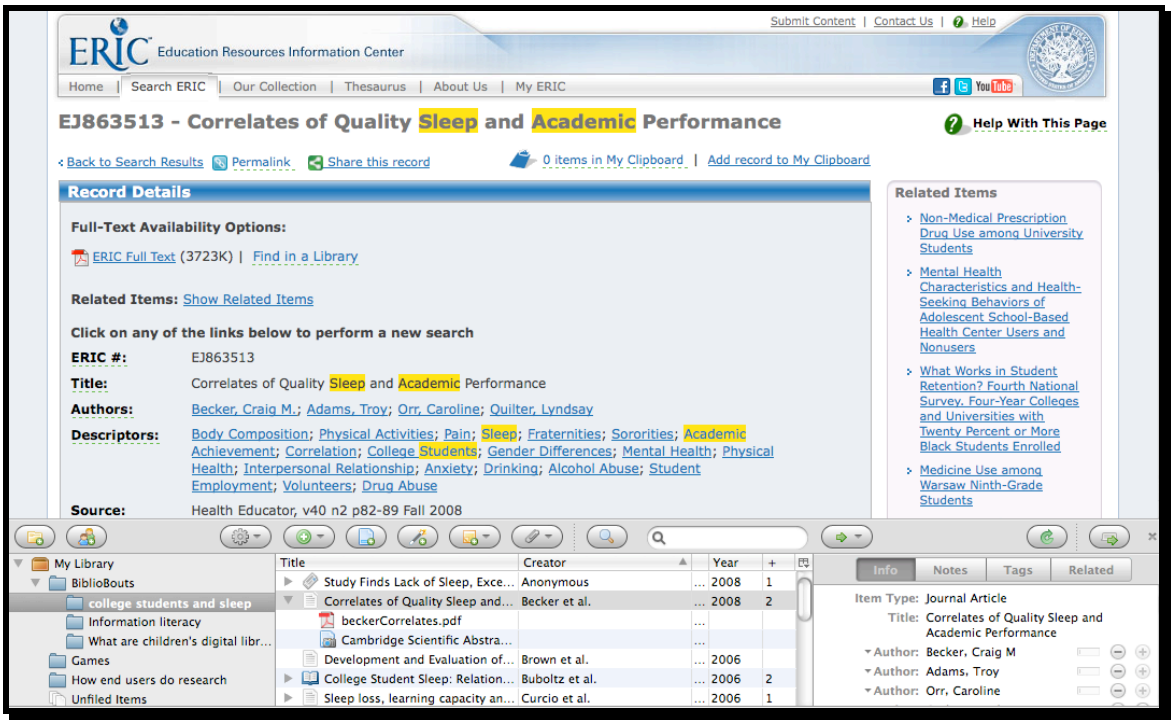
Figure 7. Too few saved sources to play BiblioBouts



In figure 7, BiblioBouts informs the player how many sources s/he has, dividing sources into two lists, one list of sources with full-text attachments and a second list of sources with no full-text attachments. This player has only 1 source with full-text attachments. BiblioBouts advises the player to continue searching for more sources.

Figure 8 shows the player doing exactly that, searching the ERIC database for sources on the topic "college students and sleep."

Figure 8. Finding sources in ERIC and saving them in Zotero

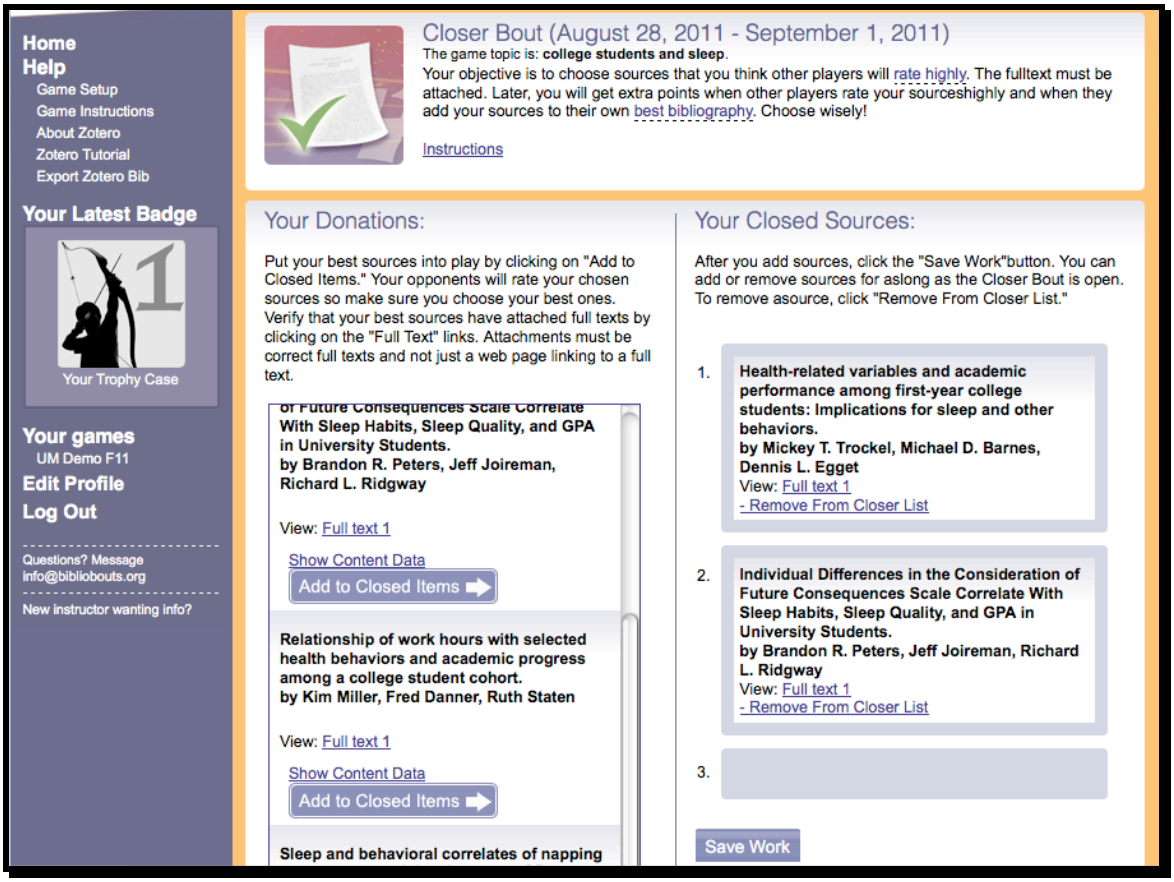


The top half of figure 8 displays a citation in the ERIC database and the bottom half displays Zotero. The player has saved the citation in Zotero and downloaded the full text PDF, naming it "beckerCorrelates.pdf" in his Zotero library. Several more sources on this topic are saved in this player's Zotero library. The next time he signs onto BiblioBouts, the game admits him because he has a sufficient number of sources with full-text attachments to play the game.

14.2.2 Playing the Closer Bout

The Closer bout lists the player's sources on the broad-based topic in play. Players can scroll through the list and reacquaint themselves with their sources' content by reading abstracts and scrutinizing attached full-texts. In this game on "college students and sleep," players choose their 3 best sources on the topic and submit them to the Closer bout. (The default number of sources is 5 but instructors can change the default when they create the game their students play.)

Figure 9. Closing sources in the Closer bout



Players who have saved a sufficient number of sources and full-texts in Zotero are able to successfully sign onto BiblioBouts and play the game's Closer bout. In figure 9, the Closer bout displays the player's sources and invites him to choose his best sources to be entered into competition for a follow-up evaluation by his opponents. The player has chosen 2 sources so far and must choose 1 more source to reach this bout's cap of 3 closed sources.

The Closer bout is usually scheduled to last 3 to 5 days.

14.2.3 Scoring the Closer Bout

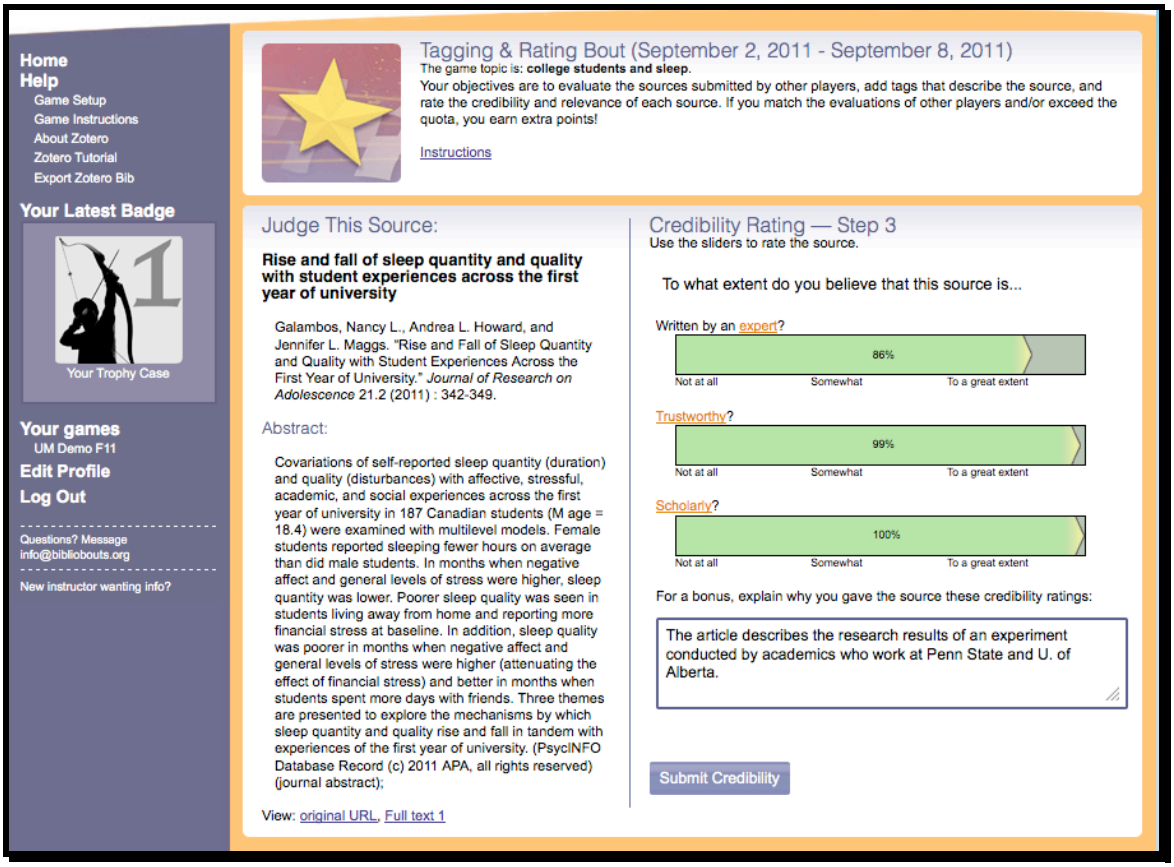
For each source that a player closes, s/he earns the base score of 10 points and earns a 360-point bonus upon reaching the cap. Because the player gets bonus points throughout the game when other players rate his or her sources highly, giving the Closer bout the short shrift could cost a player in the long run because players whose closed sources are added to most other players' best bibliographies are usually the ones who win BiblioBouts.

14.2.4 Playing the Tagging & Rating (T&R) Bout

In the Tagging & Rating (T&R) bout, BiblioBouts randomly chooses a source donated by an opponent, displays it to the player, and asks the player to assess its usefulness in several ways. Does the source include a complete full-text? Does it include a complete citation? What *is* the source, for example, is it a scholarly journal, an encyclopedia, a newspaper, a directory, or a blog? Who published it, for example, does it come from higher education, a non-profit organization, or the government? What 3 big ideas does the source discuss? This bout concludes by asking players to rate the source's relevance and credibility vis-à-vis the broad topic in play and add comments telling why they gave it the ratings they did. The number of sources that players tag and rate depends on the number of ratings per source that the instructor sets (the default is 5) and the number of unique sources players closed in the Closer bout.

In figure 10, the player rates the credibility of the source entitled "Rise and fall of sleep quantity and quality…" using the sliders to register his ratings on a scale from 0 to 100 and entering a comment into the dialogue box that tells the reasons for his ratings. S/he can download the source's full-text, open and read it to double-check for author expertise, trustworthiness, and scholarliness.

Figure 10. Rating a source's credibility in the T&R bout



After evaluating this source, the player can compare his/her tags and ratings with those of his/her fellow players. Figure 11 is the source feedback page. On top half are the player's credibility and relevance ratings for this source vis-à-vis the average of all fellow players who have rated it. On the bottom half are tabs upon which the player can click to review the comments and ratings of each player who evaluated the source. The commenter's current level, points, and badges earned to date are displayed, that is, game-play credentials that may sway the player whether to take to heart a fellow player's evaluation.

Figure 11. Comparing credibility and relevance ratings

For this source, the player's credibility and relevance ratings deviate by less than 10% from her opponents' ratings for each of the six rating criteria. As a result, BiblioBouts will award this player bonus points for matching his/her opponents' ratings.

Clicking on the "Shrike" tab reveals individual ratings and comments made by the player with the "Shrike" alias. "Shrike" holds two badges and has earned 11,400 points. Notice that "Shrike" gave this source lower "usefulness" and "good enough" ratings because the source does not focus on academic performance, a topic that appears to interest "Shrike," and may be the specific topic of his/her paper.

The Tagging & Rating bout is usually scheduled to last at least 7 days, possibly more.

14.2.5 Scoring the T&R Bout

For each source that the player rates and tags up to the quota, s/he gets a base score of 10 points. The player gets 3,040 bonus points for reaching quota. After reaching quota, the player earns 150 points per source for rating and tagging each of the next 5 sources, 250 points per source for each of the next 5 sources, 350 points per source for each of the next 5 sources, then 250 points for each of the next 5, then 150 points for each of the next 5 and after that, 10 points per tagged and rated source. Players also earn bonus points when they open full-texts, when they add comments about their ratings, when other players match their relevance and credibility ratings, and big-idea, format, and publisher tags.

14.2.6 Playing the Best Bibliography Bout

The player enters the specific topic of his or her paper, selects the 3 big ideas that the paper will discuss, and chooses the 10 best sources for his/her best bibliography. To choose these sources, BiblioBouts displays its Source Library bearing *all* sources—one's own and one's opponents' sources—put into play during the Closer bout. When players save their bibliographies, they can print them out to share with their instructors. Best bibliographies are a prospectus of their papers, listing the topic of their written papers, the big ideas they plan to discuss, and the best sources they will use to write the paper. (The default number of sources is 10 but instructors can change this when they create the game their students play.) Figure 12 shows the player choosing from the Source Library on the left sources for his best bibliography on the right.

Figure 12. Choosing sources in the Best Bibliography bout

This particular player is interested in the impact of sleep on academic performance. In fact, both of sources the player has chosen from the Source Library address this specific topic.

The Best Bibliography bout is usually scheduled to last 3 to 5 days.

14.2.7 Scoring the Best Bibliography Bout

For each source that the player rates and tags up to the quota, s/he gets a base score of 10 points. The player gets 900 bonus points for reaching this bout's cap. Examples of the many opportunities for players to earn bonus points are opening full-texts, selecting a source with high relevance and/or high credibility ratings, and selecting a source that partially or exactly matches the big ideas most players gave to it during the Tagging & Rating bout.

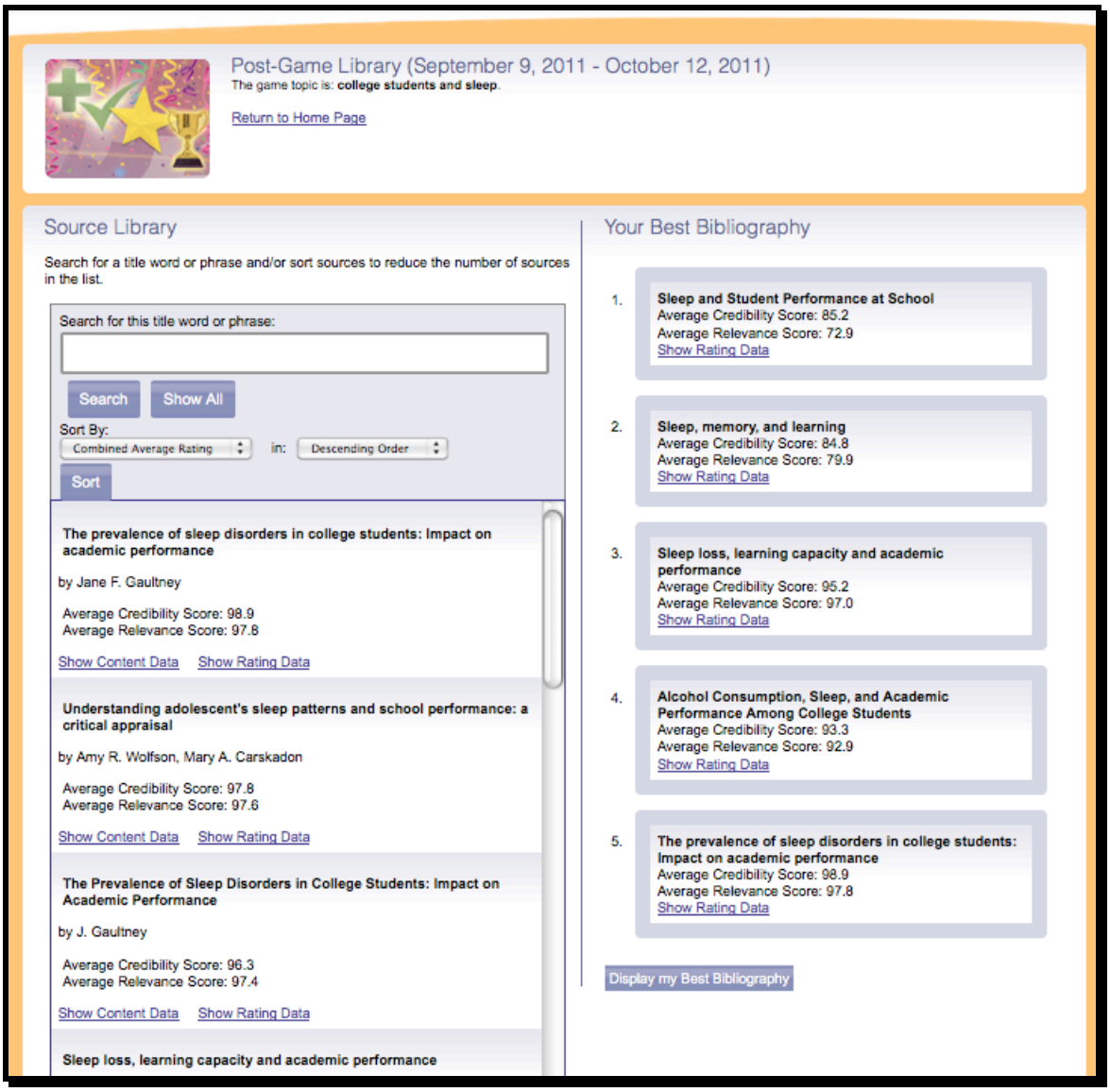
14.2.8 End-of-game Scoring Opportunities

When the Best Bibliography bout ends, BiblioBouts awards players end-of-game bonus points that pertain to the quality and usefulness of one's closed sources. The most lucrative scoring opportunity is the 750-point bonus players earn every time another player cites their closed source in his/her best bibliography.

14.2.9 Accessing the Post-Game Library

When the game ends, players have access to the Post-Game Library that contains all of the sources submitted by all players to the game including citations, abstracts, big ideas, tags, ratings, and digital full-texts. Players can search the Post-Game Library by title keywords. They can also sort the library by relevance and credibility ratings, publication date, or title. Figure 13 displays the Post-Game Library.

Figure 13. Browsing sources in the Post-Game Library



Library sources are on the left. The player has sorted them by combined relevance and credibility ratings, placing the highest-rated sources atop the Library list. The player who is browsing the Post-Game Library can also double check the titles of the sources s/he player chose for his/her best bibliography on the right. In the Post-Game Library, players can access everyone's sources including their citations, abstracts, full-texts, and ratings.

14.3 Demonstration Game

BiblioBouts features a demonstration game that anyone can play to familiarize themselves with the game. To play the demo game, go to http://bibliobouts. org/, enter "demo@bibliobouts.org for "Email" (minus the quotes) and "demo" (minus the quotes) for password. This login allows users to experience all but source-donation activities such as finding sources online and saving them in Zotero. Because the demonstration game was designed for classroom demonstrations, it is a one-person game. Multiple simultaneous sign-ons may result in unpredictable game behaviors.

14.4 BiblioBouts' Availability

BiblioBouts beta version 2.0 is available for game play in October 2011. BiblioBouts is not limited to participating institutions but is available to instructors for the asking via info@bibliobouts.org. The BiblioBouts Project team works one-on-one with instructors, librarians, and teaching assistants, advising them about incorporating the game into academic and information literacy courses and synchronizing it with the course syllabus and writing assignments.

15 Staffing the BiblioBouts Project Team

The core BiblioBouts Project team staffing remained stable throughout the period. Three additional masters-level students (Caitlin Campbell, Adrienne Matteson, and Emily Thompson) joined the team in fall 2010 and/or spring-summer 2011 to assist us coding sources in the Closer and Best Bibliography bouts and in final student papers. When their work finished in summer 2011, they took full-time professional jobs in libraries.

For the period October 2010 through September 2011, these are the members of the BiblioBouts Project team:

- PI: Professor Karen Markey
- Co-PI: Associate Professor Soo Young Rieh
- Co-PI: Associate Professor Victor Rosenberg
- Project Consultant: Fritz Swanson
- Lead Programmer-architect: Greg Peters
- Programmer and Interface Designer: Michele Wong
- Graduate Student Research Assistant: Christopher Leeder
- Doctoral Student Assistant: Beth St. Jean
- Graduate Student Assistants: Andrew Calvetti, Caitlin Campbell, Adrienne Matteson, Emily Thompson

16 Future Plans (October 2011 to September 2012)

16.1 How We Got to Where We Are Now

Our experience with the "rough but ready" alpha version of BiblioBouts demonstrated to us that both students and instructors would not use software that required greater technological sophistication than the library-research tools they had to use for their assignments. Thus, our efforts focused on designing and developing a technologically-sound and straightforward software product that did not add more technical complexity to the library-research process. Students especially wanted a game that was fun to play so our design and development efforts extended to adding more game elements, and instructors especially wanted a game with instant, up-to-the-moment game-play statistics so they could monitor their students' participation in the game and grade students when the game ended. We responded accordingly, designing and developing a full-featured game that students would play and instructors would adopt in their classes.

The team's evaluation of BiblioBouts had two key goals: (1) to improve the game so it had the functionality students wanted and (2) to demonstrate the game's learning gains and benefits so more instructors would incorporate the game into their classes. Conducting an evaluation that achieved the latter goal had to take a "back seat" until BiblioBouts was fully-functional game with all the bells and whistles that both students and instructors wanted.

The evaluation was complicated by the need to develop and test a rating scheme to evaluate the quality of the sources students cite in their papers. We could not adopt existing schemes because they had been devised before print-based publications had transitioned to the web, and thus, were biased toward rating web-based sources low and print-based sources high. Thus, we developed and tested the Five-Faceted Taxonomy for Classifying Citations to Digital Information to analyze the quality of sources players and non-players cite in their final papers (see Interim Report #3 for a full discussion.)

While other methods such as focus group interviews and pre- and post-game questionnaires yielded data that demonstrated the game's learning gains and benefits, they could not provide empirical evidence that students' papers improved as a result of playing BiblioBouts. The BiblioBouts Project team is hopeful that such evidence will tip the scales in favor of greater adoption of BiblioBouts by instructors.

The BiblioBouts Project team is now poised to conduct such an analysis. Unfortunately, it probably comes too late to use the results to recruit more instructors. Thus, we will not be able to achieve an important key to long-term sustainability—achieving a critical mass of BiblioBouts users.

In winter 2011, we submitted a proposal to IMLS to grow BiblioBouts' user base and establish a long-term sustainability model that ensures BiblioBouts maintenance, user support, and improved functionality in the future. The proposal was not funded but our request for a one-year cost extension was approved. For the period October 1, 2011 to September 30, 2012, we will use the remaining funds to accomplish these four tasks: (1) conduct an evaluation to determine whether students' papers improve as a result of playing BiblioBouts, (2) increase BiblioBouts' user base, (3) seek additional funding, and

(4) implement a sustainability model that takes into consideration failure to secure additional funding.

16.2 Evaluating BiblioBouts' Impact on Student Papers

A U-M instructor invited the BiblioBouts Project team to conduct an evaluation of the game in his large (about 200 students) undergraduate course. The major objective of the team's evaluation is to determine whether students' papers improve as a result of playing BiblioBouts. Thus, we will use the Five-Faceted Taxonomy for Classifying Citations to Digital Information to assess the quality of the sources students close in the Closer bout, choose in the Best Bibliography bout, and cite in their final papers. We will also administer pre- and post-game questionnaires, focus groups, game logs, and 6-month follow-up interviews with students and post-game personal interviews with the instructor.

16.3 Recruiting More Instructors to Incorporate BiblioBouts in their Classes

We will issue a second press release about BiblioBouts. This one will announce BiblioBouts' fully-functional game and administrative interfaces to encourage instructors to adopt the game in their courses in winter 2012. We welcome instructors at both participating and non-participating institutions to adopt BiblioBouts in their classes, advising them about incorporating the game into their courses and synchronizing it with the course syllabus and writing assignments.

Not only do the BiblioBouts Project team members' formal presentations inform others about BiblioBouts, they are geared to interest instructors to add BiblioBouts to their classes. GSRA Chris Leeder will attend the HASTAC Digital Scholarly Communication Conference from December 1–3, 2011, in Ann Arbor, to demonstrate BiblioBouts as a 21st-century tool to teach information literacy in a collaborative, peer-learning environment. On October 19, 20011 at the EDUCAUSE annual conference in Philadelphia, Co-PI Victor Rosenberg and GSRA Chris Leeder will be joined by Charles Severance, chief architect of the Sakai Project, to describe and demonstrate how BiblioBouts can be integrated into course management systems. On October 10, 2011 at the "Innovative Pedagogies" seminars sponsored by the U-M's Center for Research on Learning and Teaching (CRLT), PI Karen Markey will describe and demonstrate BiblioBouts to interested faculty and graduate student instructors.

16.4 Seeking Additional Funding for Growing the Game

We will seek additional funding for growing the game. Such funding will enable us to reach out to instructors, convince them of the game's learning gains and benefits, and work one-on-one with them to incorporate they game into their courses and assignments. Eventually, user support will transition from one-on-one personal contacts to user forums and other self-help vehicles. System development is also necessary. Students want additional game-like functionality that makes BiblioBouts even more fun and connects them with their fellow classmates, for example, the ability to rate the usefulness of credibility and relevance comments. Building basic learning tools interoperability (BLTI) into BiblioBouts will enable instructors to use their learning management system (LMS), e.g., Sakai, Moodle, Blackboard, to create games and authenticate students. We also need to develop a moderated self-service protocol that enables instructors who have no LMS to

create games and authenticate students. We can expand BiblioBouts beyond Zotero for source submission, but need additional support to build translators to citation managers such as EndNote, RefWorks, Papers, Mendeley, etc.

Because a large class of undergraduate students will be playing BiblioBouts in fall 2011, we will be able to collect more evaluation data and analyze them. Unfortunately, evaluation results will become available at the same time our funding runs out. Should positive evaluation results generate a groundswell of interest, we will be unable to support future adopters until we secure additional funding; consequently, finding additional funding for system maintenance and user support are important immediate goals.

16.5 Implementing a Near-Term Sustainability Model

Should the BiblioBouts team fail to find additional funding, game-play may be suspended starting fall 2012. While the team seeks this funding, they will search for a new future home for BiblioBouts at an existing corporation, first approaching firms invested in technology-based teaching innovations and online resource discovery and access tools because students who are learning the research process and playing BiblioBouts are likely to use their tools and innovations. Alternatively, we could create an open source project for BiblioBouts, to give the market the best chance of reusing BiblioBouts game software and moving it forward.