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An Experiential comparative analysis of two remote usability testing methods

Erika Varga

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An Experiential Comparative Analysis of Two Remote Usability Testing Methods

By

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Master of Science in Master of Science in Human Computer Interaction

Rochester Institute of Technology
B. Thomas Golisano College
of
Computing and Information Sciences

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Abstract

An Experiential Comparative Analysis of Two Remote Usability Testing Methods

Erika Varga

Remote usability testing is a key tool for usability professionals. Several remote methods exist and it is often difficult to choose the appropriate method. Testing lower-fidelity prototypes often present unique problems because they provide minimally aesthetic and minimally interactive partial representations of a final product. This qualitative and experiential pilot study is an attempt to compare a remote synchronous (RS) usability testing method where the moderator and participant are displaced by space, and a remote asynchronous (RA) usability testing method where the moderator and participant are displaced by both time and space. An important byproduct of the comparison is the creation of a low-cost, online asynchronous testing mechanism. The results show that the usability issues and participant experience vary between remote synchronous and asynchronous usability testing. While the remote asynchronous method does not require a test moderator and participants find it more convenient to complete the test whenever he or she chooses, participants may require clarification on tasks and usability issues discovered during the test. Participants are also critical of the remote asynchronous method and sometimes find it difficult to complete an entire session on his or her own time without anyone to guide them. Further research is needed to validate the results using a more controlled methodology.
Chapter 1. Introduction

Remote usability testing is a key tool for usability professionals. Various remote methods exist and it is often difficult to choose the appropriate method. Testing lower-fidelity prototypes often present unique problems because they provide minimally aesthetic and minimally interactive partial representations of a final product.

Traditional laboratory testing requires that participants travel to the same location as the moderator. Participants’ image and voice are typically recorded as he or she uses the apparatus being tested in a controlled environment. While the researcher is able to control the environment to mitigate confounding variables, traditional laboratory testing is time consuming and expensive. As work becomes increasingly spread across the globe, quick and inexpensive methods are needed to conduct effective usability testing.

The objectives of this study were to understand how the absence of a moderator in remote usability testing influences the quantity, type, and severity of usability issues discovered, participant experience, and interaction with low-fidelity prototypes. Another objective of this study was to pilot an online version of traditional, laboratory test documents.

This study report is divided into several chapters: In Chapter 1 an overview of the problem and reason for conducting this study is described, followed by Chapter 2 where related work and definitions in remote usability testing and prototype fidelity are presented. The methodology is presented in Chapter 3. The results are presented in Chapter 4, followed by a discussion comparing the two remote methods in Chapter 5, limitations and recommendations for future work in Chapter 6, and concluding remarks in Chapter 7.

1.1 Overview

Usability testing has become a popular tool for collecting valuable feedback to improve software interfaces. Traditionally testing takes place in a laboratory where the usability professional is physically located. Typically the participant lives within driving distance of the lab. During the usability test the participant receives real-time guidance from a moderator who can answer questions about the prototype or the requirements for the usability test, such as test
tasks and survey questions. If a participant is lost during a task, or is unsure about the steps required to complete the test, the moderator is there to provide guidance. This type of test also occurs in a structured environment where the researcher is able to control almost every aspect of the environment in order to prevent extraneous influences from muddling study integrity.

Having another person nearby when testing lower-fidelity prototypes is particular helpful when participants encounter problems. The moderator is able to clarify any misconceptions or confusion about the website being tested or how the prototype was built. There is almost no wait time in a laboratory test between participant questions and moderator guidance because the test occurs in real-time. Laboratory testing also affords the moderator additional sources of feedback. The moderator can pair verbal participant responses with body movement, gestures, and vocal expressions.

Usability professionals collect feedback from audiences with different cultures, physical abilities, and experiences. The globalization of work has meant that usability professionals create software user interfaces for target audiences that do not live within a reasonable distance from the moderator where lab testing might occur. Participants in different cities, states, countries and timezones would not be able to travel to a lab to complete the usability test and alternative usability testing methods are required to accommodate the physical dispersion of participants. Participants testing lower-fidelity prototypes have varying degrees of interactivity and aesthetics may require extra assistance to understand intentional functionality and not to confuse prototype snafus with usability issues.

This pilot study is a qualitative and semi-quantitative experiential discussion of how two remote methods affect usability issues discovered and participants' satisfaction with their usability testing experience. The following research questions will be answered in this study:

- How does the remote usability testing method influence the quantity, type, and severity of usability issues discovered in a low-fidelity prototype?
- How much time and assistance is required to conduct a remote usability testing?
- How does the testing method impact the participant experience?
- Is one remote testing method better suited for the low-fidelity prototype?
Chapter 2. Background

A review of recent literature was conducted to understand remote usability testing methods and prototype fidelity to frame the methodology for this study.

2.1 Remote Usability Testing Methods

Remote usability testing can take place synchronously (RS) or asynchronously (RA). In RS testing the moderator is separated spatially from participants and the test is typically conducted in real-time. Andreasen et al. (2007) simulated a RS environment by having participants visit their usability lab and communicate with the moderator in a separate room via Internet phone and screen sharing. Thompson et. al. (2004) and Castillo et. al. (1996) test participants in their own working environment. RA testing on the other hand separates the moderator from the participant in both space and time (Andreasen et al, 2007; Bruun et al, 2009; Brush et al., 2004; Castillo et. al., 1996; Tullis et. al., 2002; Petrie et. al., 2006). Three of the eight studies with remote testing methods used RS testing (Thompson et. al., 2004; Castillo et. al. 1996; Brush et. al., 2004) and four of the eight studies used RA methods (Bruun et. al., 2009; Hartson et. al., 1998; Tullis et. al., 2002; Petri et. al., 2006) (excluding Andreasen et. al., 2007). Of all eight studies conducting remote testing, only one compares both RA and RS testing methods (Andreasen et al, 2007). Testing is done in the lab in each study as either a control or as the basis for comparing it to remote methods.

The common way to conduct the RS tests was with video and audio recordings of the participants’ screen while completing tasks (Thompson et. al., 2004; Walker et. al., 2002; Bruun et. al. 2009; Castillo et. al. 1996; Tullis et. al. 2002). RA testing methods included longitudinal diaries, “user reported critical incidents”, online forums, and online questionnaires (Andreasen et al, 2007; Bruun et. al. 2009; Hartson et. al. 2004; Tullis et. al., 2002).

Several Internet services were researched as possible tools to conduct RA tests (Appendix A). It is worth noting Tullis et al.’s (2002) creation of their own free method to guide RA testing which mimics the UserZoom concept (See Appendix A for information about UserZoom). The Tullis et al. (2002) method uses two separate browser windows: a narrow window at the top of
the computer screen which contains a survey with tasks to guide the user and gather user feedback, and a second, larger browser window below the narrow window that contains the UI to be tested. The Tullis et. al. (2002) method is free compared to those more expensive tools listed in Appendix A and only requires computer programming knowledge.

### 2.2 Prototype Fidelity

Prototypes are a means of communicating design ideas with designers, development teams, and various stakeholders and can be used to discover usability issues (Rudd et. al., 1996). Prototypes range from sketchy interpretations with limited functionality to glimpses of the final product with near-complete functionality and aesthetics. Lower fidelity prototypes are typically used at the beginning of the design process to facilitate idea generation, while higher-fidelity prototypes are used toward the end of the design process to test the usability of a near-complete system. While usability testing is typically found near the middle and end of the design process, it can be performed with low-fidelity prototypes in a more limited manner. Different forms of low-fidelity prototypes can be tested, such as paper prototypes, wireframe mockups, and minimally aesthetic mockups. Low-fidelity prototypes typically need more explanation than higher-fidelity prototypes (Rudd et. al., 1996). Only two of the studies in the literature review varied the fidelity of the prototypes tested (Lim et. al., 2006; Walker et. al., 2002). Of these two studies, neither studied remote usability testing.

The purpose of low-fidelity paper prototypes is to communicate early design ideas to users cheaply and efficiently and to conduct usability testing (Nielsen-Norman Group, 2007). While Rudd et. al. (1996) believe low-fidelity prototypes are ill-suited for usability testing, the Nielsen-Norman Group (2007) believes they are a cost effective and efficient way for designers without programming knowledge to conduct usability testing.
Chapter 3. Methodology

A review of recent literature indicates that usability researchers have focused on comparing remote methods to traditional lab methods using a high-fidelity prototype with higher interactivity and aesthetics or a low-fidelity prototype with minimal interactivity and/or aesthetics. Due to a lack of investigation comparing remote RS and RA methods using low-fidelity prototypes, this pilot study has been conducted to gain insightful qualitative feedback about RS and RA remote usability testing methods. This is also an exploration into the creation of a remote tool that can be used to administer remote tests and guide the moderator and participants.

Thirteen participants completed a remote RS and RA usability test using two low-fidelity prototypes of actual game and music websites. An online guide was used by both the participant and moderator to administer the test and collect all data. Lab testing was not conducted because similar research shows conflicting results and comparisons between laboratory and remote usability testing. Moreover, limited time was available to complete the study.

3.1 Treatments

Two similar websites with similar interaction techniques will be used as the basis for the prototypes. Grooveshark (Escape Media Group, 2011) and Omgpop (Omgpop, 2011) provide a highly interactive, online experience and are good examples of “Web 2.0” type websites that use collective, user information, value user control over their information, value control above the level of a “single device”, and are services instead of software (O'Reilly, 2005).

Grooveshark and Omgpop were selected based on their wide appeal to the available participant pool and heuristic evaluations using Nielsen's 10 usability heuristics indicate that each website had several existing usability issues (Nielsen, 2010b) (Appendix B). Grooveshark and Omgpop were selected to guarantee that enough data is gathered to compare the RS and RA remote testing methods.

Grooveshark is a website for listening to music on demand. Users can compile their own music library, create playlists, search for music to add to their library, and listen to radio stations.
The website is a service where users can access their music across Internet capable devices. Users can interact with other users on the site by sharing their music listening habits with others.

Omgpop is a free and highly interactive online game website. The website is also an online service like Grooveshark, where users can access the site and play games with other users on any Internet capable device. Members can play games with each other and compete for status by collecting “coins” and achievement medals. With these coins and medals members buy virtual items for games. The website allows for social interaction through user-created chat rooms and one-on-one messaging. Members can add friends to a friend list and initiate games with them.

These websites are the basis for the two low-fidelity prototypes based on a heuristic evaluation which indicates there are several existing usability issues (Appendix B: Figures 1-2). Each prototype contained functionality focused solely on the scope of the tasks. The key functionality captured in the prototypes includes:

- **Grooveshark.com**: Search for songs, save songs for future listening, listen to songs, get information on other listeners’ listening habits
- **Omgpop.com**: Play games with friends, learn to play games, find friends, communicate with friends, and customize game play

The prototype for each website has similar characteristics:

- Shows broad concepts (navigation, content areas, information architecture), less important text will be replaced by place holder graphics (square with an “X” through the middle)
- Black lines with monochrome shades of black
- Drawn with vector graphics on a computer using Adobe Fireworks software (Adobe, 2011b)
- Minimal shading and gradients, no photographic images (Illustrations replaced with placeholders)
- Some intricate icons taken exactly as they are from the actual site, other icons are re-created
- Concepts represented using fake names (For example, replacing the Omgpop game, “Bomber Man” with the fake name, “Bomber Guy”)
• Click through interaction (The user can interact with certain elements by clicking on them, which takes them to another page.)

• Dynamic results to users' actions are represented as scripted choices. In some cases search terms are already entered in the prototype based on the tasks. In other cases, a "usability test message" will display which indicates the user has a choice or that some action is taking place. In the actual website, these user choices or actions would actually be handled dynamically and automatically by the system (Appendix E: Figures 4, 6, and 7).

Both prototypes were created by designing the static wireframes in Adobe Fireworks and then made interactive using the inVision App website (InVision App, 2011). Static wireframes were exported as images from Fireworks and then uploaded to the inVision App website tool where clickable links were added to each page in order to link them together.

3.1.2 Music Prototype

Once a heuristic evaluation was conducted for Grooveshark, tasks were created for the website. The following section describes the prototype and accompanying tasks as it was created around the key functions of the website. The tasks described below are exactly as they appeared in the online guide. A total of seventeen images were used to create the entire prototype (Appendix E: Figures 1-17). Images were linked together using clickable URLs. The only type of interaction afforded the participant was clicking on these URLs and navigating through the “pages”. A working version of the music prototype can be found at http://invis.io/PQ2HFSR/.

3.1.2.1 Tasks

Task 1: “Listen to the first two rock songs you saved.” The participant is asked to find songs they had saved in a hypothetical previous time they had used the website. Participants are expected to access a “playlist” of songs they had previously created and “listen” to the first two songs on the list (Figure 1). Participants had to click on a song which displayed a message
indicating the song had played. Success for this task was measured by whether the participant played the two songs in the “Rock” playlist.

Task 2: “Search for the song, 'King for a Day,' by Green Day and add it to a new playlist called 'Green Day Favorites'”. The participant is asked to search the website for a particular song and add it to a newly created playlist (Figure 2). In the prototype the participant is able to run through the motions of finding the song and creating a playlist, but the prototype does not actually create the playlist nor save the song to it. Success is measured by the participant hitting the “Create” button to finish creating a new playlist.

Task 3: “Your friend 'bmetal' also uses this website. Find out what he has listened to recently.” The participant is asked to search the community of members for a person called “bmetal” (Figure 3). To determine what “bmetal” has listened to, the participant is expected to navigate to this person's profile page to find out what they have listened to recently. Success for this task is measured by the participant finding “bmetal's” profile page and finding the status messages on the profile page indicating what they've listened to recently.

Figure 1: The “Rock” playlist
Figure 2: Creating a new playlist from a song in the search results

Figure 3: A community member's profile page indicating their listening habits
3.1.3 Game Prototype

Once a heuristic evaluation was conducted for Omgpop, tasks were created for the website. The following section describes the prototype and accompanying tasks as it was created around the key functions of the website. A total of fifteen individual images were used to create the entire prototype (Appendix F: Figures 1-15). Images were linked together using clickable URLs. The only type of interaction afforded the participant was clicking on these URLs and navigating through the “pages”. A working version of the music prototype can be found at http://invis.io/KC2VEEZ/.

3.1.3.1 Tasks

Task 1: “Learn how to play the Bomber Guy game”. The participant is asked to find particular information on how to play the Bomber Guy game (Figure 4). The participant should find the Bomber Guy game and the page that has a graphics illustrating game play. Success is measured by the participant finding this page.

Task 2: “Find your friend 'john86' and start a game of Bomber Guy with him.” The participant is asked to navigate the Bomber Guy game screen where they queue up to play the game with other members. The participant must click the “Play” button to navigate to this screen. Once there, the participant must either copy and paste an invitation link to the game in a chat window to “john86” or the participant must hit the “Invite” button in the chat window (Figure 5). Success is measured by whether the participant can copy and paste this link or invite them via the chat window.

Task 3: “Buy a shirt for your Bomber Guy character to wear in the Bomber Guy game.” The participant should find the Bomber Guy game shop, which can be accessed via the “Shop” menu at the top of the page, the top game menu when viewing the main game page, or a button at the right side of the page when queuing to play the game (Figure 6). Success is measured by whether the participant opens the pop-up dialog to buy a shirt for the Bomber Guy character.
Figure 4: Graphic illustrating how to play a game

Figure 5: Inviting a friend to play a game through the “Invite” feature in the chat window
3.2 Metrics

A mix of qualitative and quantitative metrics were used to compare the RS and RA remote testing methods. The following metrics will be collected to answer the research questions:

- Qualitative
  - Usability issue type (as discovered from the data, ex. “unclear meaning or label”) (Lim et. al., page 297, 2006; Brush et al., 2004; Walker et. al., 2002; Petrie et al., 2006; Brush et al., 2004; Andreasen et al, 2007)
  - Usability issue severity rating (using Nielsen’s (2010) severity rating scale) (Petrie et al., 2006; Brush et al., 2004; Andreasen et al, 2007; Bruun et al., 2009)
  - Participant experience (satisfaction/difficulty with each testing method and prototype fidelity gathered through observation and questionnaire data) (Petrie et al., 2006)
• Quantitative
  ◦ Number of usability issues (Lim et. al, 2006; Petrie et al., 2006; Brush et al., 2004; Walker et. al, 2002; Petrie et al., 2006; Brush et al., 2004; Andreasen et al. 2007; Bruun et al., 2009)
  ◦ Moderator and participant time on setup/pre-test, time on task, and post-test
    (Moderator time starts when the moderator administers pre-test materials and questionnaires and ends when the moderator completes the post-test wrap up. Participant time starts when the participant begins the pre-test questionnaire and ends when the participant completes the post-test wrap up.) (Bruun et al., 2009)

Using both qualitative and quantitative metrics will provide a more holistic view of the participant experience with the prototypes in each of the remote settings. The number of usability issues, test time, usability issue type, and usability issue severity will help determine whether each of the scenarios produce the same results. The participant experience data will help determine how those involved feel about the methods and how they fit into the participants’ own context (ex. easy to use while working from home office).

### 3.3 Experimental Design

This study is a 2 x 2 factorial design where the independent variables are remote testing method and website tested (Table 1). The dependent variables are a mix of qualitative and quantitative data that focuses on usability issues discovered, time required to conduct testing, and moderator and participant experience.

**Table 1: Within-subjects experimental design**

<table>
<thead>
<tr>
<th></th>
<th>RS Method</th>
<th>RA Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototype 1: Low-fidelity music website</td>
<td>6 participants</td>
<td>6 participants</td>
</tr>
<tr>
<td>Prototype 2: Low-fidelity game website</td>
<td>6 participants</td>
<td>6 participants</td>
</tr>
<tr>
<td>Total sample size: 24 participants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The experimental design is a within-subjects design and comparisons will be made using descriptive statistics and qualitative analysis. Table 2 describes which prototype and remote method each participant will test and the sequence of tasks. Each participant completed a usability test with the RS and a usability test with the RA method. The researcher was the moderator for the RS method only and participants used a self-guided approach for the RA method.

Table 2: Participant testing sequences and task counterbalancing

<table>
<thead>
<tr>
<th>Participant</th>
<th>Prototype</th>
<th>Remote method</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Prototype</th>
<th>Remote method</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>music</td>
<td>sync</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>game</td>
<td>async</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>music</td>
<td>sync</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>game</td>
<td>async</td>
<td>2</td>
<td>3</td>
<td>1</td>
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<td>sync</td>
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<td>2</td>
<td>3</td>
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<td>music</td>
<td>async</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
3.4 Participant Recruitment

Participants were screened for particular characteristics to ensure they met the following requirements:

- Age 18 to 52
- General knowledge of and experience with the Internet
- No previous experience with the specific prototypes
- General knowledge of the subject matter presented in the prototypes

The full participant profiles are described in Table 3.

Table 3: Prospective participant profiles

<table>
<thead>
<tr>
<th>Generic characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18-52</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Currently enrolled in a 4-year, undergraduate degree at RIT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relevant characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer use</td>
<td>Experienced web user</td>
</tr>
<tr>
<td>Subject matter experience (with music and games)</td>
<td>General knowledge of the concepts and similar websites/experiences</td>
</tr>
<tr>
<td>Experience with Grooveshark.com and Omgpop.com</td>
<td>None</td>
</tr>
<tr>
<td>Experience with human-computer interaction</td>
<td>Little to no experience</td>
</tr>
</tbody>
</table>

Participants were recruited from the Golisano College of Computing and Information Sciences student population at Rochester Institute of Technology in Rochester, New York and from the researcher's online social networks. Inquiries for participant involvement were posted to Facebook (Facebook, 2011) and Twitter (Twitter, 2011).

An email was sent to all Golisano students with a summary about the two usability tests inquiring about prospective participants (Appendix D: Figure 1). A link to the qualification survey was included in the email to screen prospective participants (Appendix D: Figure 2). The qualification survey was created and stored on the SurveyGizmo website (Widgix, 2011).

Messages inquiring about prospective participants were also posted on the researcher’s Facebook account and SurveyGizmo's Twitter account (Appendix D: Figures 3-4) with a link to the qualification survey. Friends of the researcher were also directly contacted via email and...
online in order to find more participants. Anyone interested was instructed to fill out the qualification survey and sent a link via either email or online instant messaging. Students who met the study’s qualifications were emailed instructions to complete both sessions. Two participants each completed an RS and RA pilot test to ensure the study’s methodology was sound and that adequate resources existed.

3.5 Remote Synchronous Testing Method

The following section describes the methodology used for the RS session. The materials used to guide the participant and moderator, and method for collecting qualitative and quantitative data are discussed first. Next, the environment where the participant and moderator completed the usability test is described, followed by the procedure for completing the usability test.

3.5.1 Materials

An online test guide was created using Wordpress on the researcher's personal website (Wordpress, 2011) to direct the moderator and participant through the RS session. The guide was similar to traditional paper-based guides used during lab usability testing (Rubin & Chisnell, 2008). The guide was enhanced by tracking participants to display the right tasks and prototype. All usability test materials (consent form, pre-session survey, task difficulty ratings, and post-session survey) were collected through the online guide using integrated surveys created with the SurveyGizmo website (Widgix, 2011). An online format was chosen to better suit the online nature of the remote method which was easier to distribute to participants and easier for the researcher to update before testing. The online guide was created using a simplistic, wizard-type layout; created dynamic associations between the participant using the guide and the information collected via the surveys in the guide; and consisted of four main content areas: welcoming the participant to the study and the session, getting started with the session, completing the tasks, and wrapping up the session.
3.5.1.1  Layout and Structure

A simplistic, pre-made blog theme was used to provide the underlying layout (Fiegel, 2011). The theme was modified to act like a wizard, where a set of instructions must be completed in a certain order to reach an end goal. Each page had the title of the study at the top of the page along with the type of method for the session (Area designated as number 1 in Figures 7 and 8). Each page also had the same navigation with a link to each page of the guide (Area designated as number 2 in Figure 7 and 8). Each page also had a large, main content area to place all the information for each step of the usability test (Area designated as number 3 in Figure 7 and 8).

Figure 7: Welcome page layout for the online guide

The guide consisted of four main pages which align with the main parts of a usability test: Welcome, Get started, The Tasks, and After the test. The Welcome page introduced the participant to study and to the particular session method (RS or RA). The remaining three pages were each divided into sub-tasks on the page that guided the user through the steps required to complete that part of the usability test.
3.5.1.2 Dynamic Content

A login page was created using the Wordpress plugins, “Custom Login Page,” (Chia, 2011) and “Members Only” (Hamilton, 2011). Participants authenticated with their email address and a password set by the researcher to view the online guide. A participant's unique ID number was used as a variable in the PHP and HTML code to dynamically display content on the page (tasks, prototype link) and to submit information about himself, the prototype, and his survey responses.

The tasks and link to the prototype were dynamically displayed on the page based on the participant that logged into the online guide using PHP. Information about the participant, prototype, and method was collected by the surveys using dynamically created URLs to the surveys in the online guide. For example, when a user logged in, a link to the “Pre-session” survey was displayed in the guide using PHP variables, which sent information about the session to the survey: http://edu.surveygizmo.com/s3/505900/presession?method=sync&user_id=1&website=music/.

The “method” and “website” were determined in the Wordpress code according to the participant's unique ID number (“user_id”). This additional information from the online guides was saved as variables in the survey.

Figure 8: Page layout for pre-test activities, the tasks, and post-test activities
3.5.1.3 Content Areas

The guide was broken into four main parts: Welcome, Get Started, The Tasks, and After the Test. Each of the four parts was then divided into sub-steps. The sub-steps were shown and hidden using a collapsing menu that only showed one step at a time. The first page, “1. Get Started,” was divided into five sub-steps: “Submit the consent form”, “Fill out the pre-session survey”, “Perform a think aloud example”, “Open the prototype”, and “Share the participant's screen” (Figure 10).

The second page, “2. Tasks,” was divided into 3 sub-steps: “Task 1”, “Task 2”, and “Task 3” (Figure 11). Instructions were printed at the top of the page reminding the participant to think aloud. A message was displayed that the moderator would start recording audio and video.

The third page, “3. After the test,” was divided into two sub-steps: “Post-session survey” and a final note about completing the session and that the moderator would stop recording the session (Figure 12).
**Figure 10: Getting started page**

**Figure 11: Tasks page**

**Figure 12: After the test page**
The RS online guide can be visited at http://www.xune.net/guides/sync/ using a username of “participant” and a password of “sync123”.

3.5.2 Environment

The moderator was located in an HCI Lab in the Golisano College of Computer and Information Sciences at Rochester Institute of Technology in Rochester, New York or the researcher's home in Rochester, New York, depending on convenience and access to adequate Internet connection speeds.

Participants completed the RS session in a location of their choice and had access to different environments and types of computer software and hardware. Eleven participants completed the RS session from home and the remaining two completed the session at school. Ten participants completed the RS session in a quiet, home environment and at least five of these participants were the only ones in the room.

Ten participants used a laptop to complete the RS session and three participants used a desktop computer. Nine of the thirteen participants used a computer whose screen ranged from “13 to 18 inches”. The remaining four participants had a computer screen size less than thirteen inches or greater than eighteen inches. Participants used their computers for a wide range of reasons: school and entertainment (five participants), only entertainment (two participants), and school, work, and entertainment (two participants).

3.5.3 Procedure

The participant received an email with instructions for completing the RS session (Appendix D: Figure 5). The email indicated when the moderator would call the participant. For participants completing the RS session first, the participant was instructed to complete the informed consent form and download the Skype program for communicating with the moderator and sharing their screen (Appendix D: Figure 7). The consent form could be uploaded to a

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1 The participant indicated on the qualification survey when they were available to complete the RS session. This date and time was indicated on the email with session instructions. If the participant did not indicate their availability in the qualification survey, then a link to the YouCanBook.me website to indicate their availability was included in the email.
survey. The email included a link to the online test guide with details on the participant's user name required to log into the secured website for the online guide.

On the day of the test, the moderator called the participant's mobile phone using Skype (Skype Limited, 2011) or a mobile phone. If the participant was willing, both moderator and participant used Skype for communicating. The moderator instructed the participant to visit the online guide to use throughout the session. The moderator then introduced the study and session to the participant and instructed the participant to read and sign a consent form if they had not already done so as instructed in the set of instructions emailed to them. Next the participant was asked to perform a thinking aloud example.

Participants were encouraged to use the think-aloud protocol as they completed the three tasks. Participants were asked to indicate when they had started and completed each task. Time on task is defined as the time from when the participant starts reading the task aloud and says “Done,” or a phrase indicating completion (for example, “I think that's what I'd do to complete the task.”).

The participant shared their screen with the moderator using Skype or IBM LotusLive (IBM, 2011) as they completed three tasks in the prototype. The moderator recorded the participant's screen and the audio conversation using a 30-day trial of Camtasia (Techsmith, 2011), Camstudio (RenderSoft, 2011), or VodBurner (Netralia Pty Ltd, 2011). After completing the tasks, the participant completed a post-session survey. The moderator’s voice was also recorded using Camtasia. The participant completed three tasks and logged the task difficulty rating for each task (Appendix D: Figure 9). The online guide displayed the tasks for the particular participant completing the session based on the information used to gain access to the online guide. After the participant responded to the task difficulty rating survey, the moderator asked any questions applicable to the task.

After completing the three tasks, the participant completed a post-session survey which collected information about the prototype and remote method used in the session (Appendix D: Figure 10). If it was the participant's second session, additional questions appeared in the survey asking the participant to compare his or her experience using both prototypes and remote methods. If the RS session was the participant's first session, the moderator gave verbal instructions at the end of the session on how to complete the second RA session. The moderator
also verbally gave the password for the RA online guide to the participant. The time to complete the post-session activities is defined as the time in seconds from the participant rated Task 3 or when the moderator finished asking questions about Task 3 to the end of the session.

3.6 Remote Asynchronous Testing Method

The following section describes the methodology used for the RA session. First the materials used to guide the participant and moderator and method for collecting qualitative and quantitative data is discussed. Next, the environment where the participant and moderator completed the usability test is described, followed by the procedure for completing the usability test.

3.6.1 Materials

An online test guide was created for the RA session similar to the guide created for the RS session to direct the moderator and participant through the usability test. Both guides were created to be as similar as possible with the intention that the participant in the RA session would perform all or most of the same actions as those experienced when completing the RS session. The differences in the RA session online guide are described below.

3.6.1.1 Layout and Structure

The layout and structure in the online guide for the RA method was the same as the RS method.

3.6.1.2 Dynamic Content

Dynamic content in the online guide for the RA method was the same as the RS method.

3.6.1.3 Content Areas

The first page, “1. Get Started,” was the same for the RA method as it was for the RS method, except that section for the participant to share his or her screen was replaced by “Record audio and video.”
The second page, “2. Tasks,” was the same for the RA method as it was for the RS method, except that the instructions at the top of the page reminding the moderator to record the session was replaced by instructions reminding the participant to start recording his or her screen.

The third page, “3. After the test,” was the same for the RA method as it was for the RS method, except that there was an additional section (Section 1) instructing the participant to stop the recording and how to submit it to the moderator.

The RA guide can be visited at http://www.xune.net/guides/async/ using a username of “participant” and a password of “async456”.

3.6.2 Environment

There was no moderator for this session. Eight participants completed the RA session at home, one at school, and two at work. Eight participants completed the RA session in a quiet, home environment and at least six participants were the only person in the room.

Eight participants used a laptop to complete the RA session and three participants used a desktop computer to complete the RA session. Nine participants used a computer whose screen ranged from “13 to 18 inches” and three participants had a computer screen size smaller than thirteen inches or larger than eighteen inches.

Participants used their computers for a wide range of reasons: school and entertainment (three participants) and school, work, and entertainment (three participants).

3.6.3 Procedure

Within five days of receiving an email with instructions, the participant was required to complete the RA test using the online guide. The procedure for the RA session was the same as the RS method, except that the participant recorded their screen and audio commentary using the ScreenCastle website (Steinmann, 2009) or Krut Screen Recorder software (Östby and Berggren, 2004). After completing the tasks, participants were instructed to send their recorded audio and video file to the researcher. The time it took to complete the post-session activities is defined as the time range when the video was not recorded. The session start time is the time when the
participant submitted the pre-session survey and the session end time is when the participant submitted the video recording to the moderator. The total video time is subtracted from the total session time to calculate the time when the session was not recorded. An accurate time when the participant started and stopped the recording cannot be determined, so a range of time is proposed as the possible max amount of time that the pre-session could have occurred.

3.7 Pilot Tests

Two pilot tests were conducted to discover any issues with the usability test methodology. An RS and RA session for both the music and game prototypes was tested (Table 4). The first pilot test with Participant 1 was run on May 5, 2011 from 6:50 PM to 7:53 PM. Several issues were discovered from this RS pilot test with the music prototype:

- Two links in the online guide were not working: “Click here to begin” on the Welcome page and the link to open the page to upload the consent form
- The participant had to install the screen sharing program during the test which took about 5 extra minutes of test time. Instead, pre-requisite software should be downloaded before the participant starts the RS session.
- There were no questions in the post-session survey about the type of environment the participant was located in during the session. These questions should be added to the post-session survey.
- The participant was confused by seeing “What did you like least about...” before questions asking “What did you like most about...” The participant expected the questions asking what was liked most to appear first. These types of questions should be reversed.
- The participant stressed the point that she would have liked to have been able to navigate through more of the prototype by being able to click links. The prototype was left as is, since the intention of this type of low-fidelity prototype is to make only certain parts interactive.

Participant 1 did not report any difficulties with the RA session.
Table 4: Participant testing sequences for pilot tests

<table>
<thead>
<tr>
<th>Participant</th>
<th>Session 1</th>
<th>Session 2</th>
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<td></td>
<td>Prototype</td>
<td>Remote method</td>
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<td>1</td>
<td>music</td>
<td>sync</td>
</tr>
<tr>
<td>2</td>
<td>game</td>
<td>async</td>
</tr>
</tbody>
</table>

The second RS pilot test was run on May 15, 2011 from 9:30 PM to 10:30 PM. Several issues were discovered from this RS pilot test with the game prototype:

- At the time of the pilot test, Microsoft SharedView (Microsoft, 2011) was planned to have the participant share their screen. Participant 2 had a Mac OS and could not run the Windows only SharedView application. It is important to ensure that any usability test software works for all participants.

Participant 2 also noted several issues with the RS method:

- The participant had trouble using ScreenCastle to create an audio/video recording file. After completing the RA session and having run the recorder during the session, the participant stated that the recorder locked up and would not produce the final file.

Software chosen for the usability test should work for all participants. Alternative online screen recorders were not suitable and therefore Screen Castle and a desktop recorder, Krut Recorder (Östby & Berggren, 2004), were presented as two options the participant could choose from to record their RA session.

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2 Alternative online screen recorders were not suitable and therefore Screen Castle and a desktop recorder, Krut Recorder (Östby & Berggren, 2004), were presented as two options the participant could choose from to record their RA session.
Chapter 4. Results

Participants were recruited between May 6, 2011 and June 29, 2011. 416 people attempted the qualification survey. The response rate for the qualification survey was close to 39% (actual 38.94%). Thirteen people were successfully recruited and completed the study (Figure 13). All other respondents did not qualify or were no longer interested in participating in the study.

People that attempted the survey were those who did not submit the survey using the “Submit” button on the final page of the survey. Those who had submitted the survey in this way were considered to be those who “Completed” the survey. Qualifying respondents must have “Completed” the survey and also met the conditions to participate in the study (See Methodology for participant qualification requirements). Participants that successfully “completed the study” were those who “qualified for [the] study” and also completed at least one of the two usability test sessions (Table 5). RS and RA usability testing was conducted between May 23, 2011 and July 9, 2011.
### Table 5: Actual participant profiles

<table>
<thead>
<tr>
<th>Generic characteristics</th>
<th></th>
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<tbody>
<tr>
<td>Age</td>
<td>18-52</td>
</tr>
<tr>
<td>Education</td>
<td>Currently enrolled in a 4-year, undergraduate degree at RIT, currently enrolled in a 2+ year graduate degree at RIT, or previously graduated within the past 5 months from RIT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relevant characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer use</td>
<td>Experienced web use</td>
</tr>
<tr>
<td>Subject matter experience (with music and games)</td>
<td>General knowledge of the concepts and similar websites/experiences</td>
</tr>
<tr>
<td>Experience with Grooveshark.com and Omgpop.com</td>
<td>None</td>
</tr>
<tr>
<td>Human-computer interaction experience</td>
<td>Little to no experience or experienced</td>
</tr>
</tbody>
</table>

#### 4.1 Participant Demographics and Experience

Information was collected on each participant to ensure they met the study's criteria (Appendix C).

##### 4.1.1 Demographics

Eleven participants were between the ages of “18 and 35” and two participants were between the ages of “36 and 52”. Seven participants were graduate students and the remaining six were undergraduate students. There were no participants younger than seventeen or older than fifty-two. No participants indicated they required assistive technologies to complete the study.

##### 4.1.2 Experience with the Internet

Each participant spent an average of twenty hours on the Internet in the week leading up to the RS or RA session. The top three activities that participants spent the most time on were listening to music (average of 11.8 hours), studying/reading/writing (average of 11.6 hours), and playing games (average of 5.9 hours) (Figure 14 and 15). The activities that participants spent the least amount of time were programming and shopping.
"How many hours do you spend on the following activities a week?"

Number of respondents = 13

Figure 14: Average number of hours spent per week on various online and offline activities

"How many hours do you spend on the following activities a week?"

Number of respondents = 13

Figure 15: Number of hours on each activity by hours spent online, offline, or both
4.1.3 Experience with HCI

Participants had varying degrees of experience with HCI concepts and practices, such as human factors, usability testing, and usability engineering. Nine participants had little to no experience with HCI (Columns “No experience”, “Heard topics”, and “Read topics”, Figure 16). Two people with little to no experience had been involved as a usability test participant in the past, but this involvement is not considered as HCI experience, because no understanding of the HCI process is required, other than being able to produce applicable feedback for the usability test. Four participants were either studying HCI as a graduate student, working in an HCI field, or both studying and working in an HCI field. This group of participants had far more experience than those with little to no experience.

4.1.4 Experience with Usability Testing

Seven participants reported they had participated in at least one usability study in the past, while the other six participants reported they had not (Figure 17). Six of the seven participants who participated in a usability test in the past, indicated they had done so one to five times (Figure 18). The seventh person had been a participant in five to ten usability tests. No one who had been a participant in the past had done so more than ten times.

Three participants who were involved as participants in other usability tests in the past indicated that they had participated in lab-type settings where a moderator was on-site to guide them. A fourth person had also participated in usability tests in the past but had not indicated whether it was in a lab-type setting or otherwise. All three participants provided feedback in these tests through predefined questions. The fourth person was a moderator and did not mention the type of remote testing method he or she used.
Notes about Figure 19: “No experience” = Participant has not heard about HCI, read HCI topics, taken HCI courses, worked toward or completed an HCI degree, worked as an HCI professional. “Heard topics” = Participant has heard about HCI topics. “Read topics” = Participant has read about HCI topics on their own time. “Studying HCI” = Participant has completed or is working toward an HCI-related degree. “HCI professional” = Participant who works in an HCI-related field. “Studying HCI and is a professional” = Participant has completed or is working toward an HCI-related degree and is also working as an HCI professional.

Figure 16: Level of HCI experience

Figure 17: Participants who participated in a usability study in the past
4.1.5 Experience with the Prototype Websites and Content Areas

To assess whether prospective participants had used the prototypes in this study, participants were asked how frequently they visited music and game websites in the past month. Participants were also asked what types of sources they use to listen to music and what types of games they play.

4.1.5.1 Music

Participants used multiple sources to listen to music in the month leading up to the usability tests (Figure 19). The most used sources for listening to music include streaming music websites, digital devices, AM/FM radios, and music stored locally on a computer. Satellite radio was the least used (one participant). Many participants used a combination of these sources (Figure 20). All twelve (one participant did not complete the pre-session survey assessing their music experiences) respondents used between three and six different sources to listen to music.

Figure 18: Number of times participants have participated in usability studies in the past

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3 “Past month” is defined as the last 30 days from the time the participant completed the qualification survey and may vary by participant.
"What sources do you use to listen to music?"

Number of respondents = 12

- Stream online (on demand)
- Satellite radio
- Online radio
- AM/FM receiver
- Music stored locally on my computer
- Digital device (iPod, iPhone, Zune, etc.)
- CDs, cassette tapes, vinyl

Figure 19: Sources for listening to music

"What sources do you use to listen to music?"

Number of respondents = 12

Figure 20: Number of music sources per respondent
All thirteen prospective participants at the time of the qualification survey had not used Grooveshark in the past month, the website that is the basis for the music prototype (Figure 21). Pandora was visited by eleven participants at least once in the past month, which is the most frequented among all the music sites surveyed. Last.FM, free.napster.com, and AOL Music were also visited by at least one participant in the past month. No other music sites were visited in the past month.

Actual music usage was also assessed at the time they completed either the RA or RS session using the same question that appeared in the qualification survey (Figure 22). One participant did not fill out the pre-session survey and is not included in this assessment. Since the time of the qualification survey, participants visited several additional music sites: eMusic, Yahoo! Music, Slacker radio, and Myspace music. No participant had listened to Grooveshark.

Figure 21: Prospective participants' experience with actual music websites
Games

Participants play various types of games (Figure 23). Puzzles, role-playing games (RPGs), board games, and racing games were most played in the month leading up to the usability study. Puzzle games are played by most participants (twelve participants) and other types of games such as arcade and visual novel are played by only two participants. Nine participants played between four and five different types of games (Figure 24). Two participants played less than three types and three participants played five to six types of different games.

All thirteen participants at the time of the qualification survey had not used Omegpop, the website that is the basis for the game prototype, in the past month (Figure 25). Armor Games, Bing games, Candystand, Games.com, Kongregate, Miniclip, Pogo, Popcap, Shockwave, and Yahoo! Games were all visited between one and ten times by at least one participant within the past month. At least one participant visited Games.com, Miniclip, Popcap, and Shockwave between eleven and twenty times in the past month. Gameforge was the only other website not visited by any participants.
"What types of games do you play?"
Number of respondents = 13

Figure 23: Types of games played

"What types of games do you play?"
Number of respondents = 13

Figure 24: Number of types of games played
Game usage was also assessed at the time they completed either the RA or RS session using the same question that appeared in the qualification survey. Since the qualification survey, four more participants indicated they had visited Games.com in the past month. Several participants visited Armor Games, Bing games, Games.com, Kongregate, Miniclip, Pogo, Shockwave, and Yahoo! Games between one and ten times in the past one month. No participant had visited Omgpop.com.

### 4.2 Remote Synchronous Testing Method

Thirteen participants completed the RS session. It took participants approximately thirty-one minutes to complete the RS session (Table 6). It took participants approximately twenty minutes to complete the pre-session activities, two minutes to complete the tasks, and nine minutes to complete the post-session activities.
Table 6: Time to complete each part of the RS method (minutes)

<table>
<thead>
<tr>
<th>Session Part</th>
<th>Average</th>
<th>Min</th>
<th>Max</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-session</td>
<td>19.65</td>
<td>8.58</td>
<td>31.2</td>
<td>13.76</td>
</tr>
<tr>
<td>Tasks</td>
<td>2.26</td>
<td>0.67</td>
<td>6.45</td>
<td>3.05</td>
</tr>
<tr>
<td>Post-session</td>
<td>8.89</td>
<td>2.35</td>
<td>15.28</td>
<td>3.46</td>
</tr>
<tr>
<td>Total</td>
<td>30.75</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Eight found it convenient to be able to participate in a usability test remotely without having to visit a physical location. One participant stated that he liked “being able to participate at [his] own convenience from [his] home office.” Even though many of the participants found the RS method convenient, many had issues with the technology used to share his or her screen. Five participants were “Very satisfied” or “Satisfied” with the technology they used to complete the RS session, while three were “Dissatisfied” or “Very Dissatisfied” (Figure 26). These issues are described in more detail in the Pre-session section below.

All twelve participants were either “Very satisfied” or “Satisfied” with thinking aloud during the session and were “Very satisfied” or “Satisfied” with the time it took to complete the entire session.

Participants rated their agreement with various statements about the RS method (Figure 27). More than 80% of participants had difficulty figuring out what to do to complete the session and approximately 10% did not find the online guide helpful. Although overall, participants “Strongly agreed” or “Agreed” that they had a positive experience.
**Figure 26: Satisfaction with the RS activities**

![Satisfaction with the RS activities](image)

**Figure 27: Level of agreement with statements about the RS method**

![Level of agreement with statements about the RS method](image)
4.2.1 Pre-session

The plan was to use Skype to call the participant on his or her mobile phone, to share the participant's screen using either Skype or LotusLive, and use Camtasia to record the audio and video. Testing took longer than expected and the Camtasia trial expired. Camtasia was replaced by the VodBurner software that connects with the Skype application to record audio and video calls through Skype.

Depending on the method used for the audio chat or sharing the screen, the other method was chosen accordingly (Figure 28). For example, if the participant wanted to talk on their mobile phone and not Skype, LotusLive was used to share the screen. One participant could not audio chat on Skype because she did not have a computer microphone, but she could share her screen using Skype. Since she already had Skype screen sharing working, the moderator opted to use Skype instead of LotusLive. The complete software method used for this session was Skype screen sharing, the moderator used their mobile phone to call the participant on their mobile phone, and Camstudio was used to record the mobile to mobile conversation.

There were several issues with sharing the participant's screen. During one session the moderator discovered that a call from Skype to a participant's mobile phone would not work simultaneously with the participant using Skype to share their screen. The participant switched to LotusLive instead. Another participant also had trouble using Skype. The participant had to re-install the recommended updates for Skype before the sessions could start. The resulting recording for this session was also faulty. While the entire session was recorded, the file does not capture the audio and video after a few seconds.

In two other sessions the moderator's Internet connection disconnected and the Skype call was lost, but the moderator was able to resume where the session was interrupted. In another session LotusLive stopped working repeatedly, so the participant had to take time to stop and restart sharing his screen. In a fourth session VodBurner stopped recording after the second task, so the moderator took notes instead of relying solely on the video.

4 The moderator called the participant's mobile phone using the Skype application on my computer. People on the other end are not able to share their screen while this voice call is occurring, thus it was not possible for the moderator to call the participant on his or her mobile phone using Skype and also have the participant share his or her screen through Skype. There were two solutions to this issue. If the participant could not voice chat on Skype, LotusLive was used to share his or her screen. If the participant was able to voice chat on Skype, then Skype was used to share his or her screen.
Two participants commented about the lack of a microphone to complete the RS session. One participant wanted to use a microphone to talk with the moderator on her computer, but did not have a microphone on hand and instead had to use her mobile phone. The participant found this inconvenient because she had to rest the phone on her shoulder while she completed the tasks. A second participant disliked that it took time away from the test to find and setup his microphone and stated, “There are a lot of steps involved.”

The time it took to complete the pre-session activities is defined as the time, in seconds, the session began to the time the first task started.

![Figure 28: Software used to share the participant's screen, record voice, and record audio in the RS method](chart)

All thirteen participants completed the pre-session survey (Appendix C: Figure 8). The first two participants that completed the pre-session survey using the music prototype were not able to respond to two questions about their music experiences:

- “How many times have you used these streaming music websites in the past 1 month?”
- “What sources do you use to listen to music?”

These participants were not able to respond to these questions because there was an error in the online guide to successfully communicate with the survey to show the question.
Six participants were “very satisfied” with completing the pre-session activities and four participants were “satisfied” with completing the pre-session activities for the RS session (Figure 29).

![Participant satisfaction with completing the RS pre-session activities](image)

**Figure 29: Participant satisfaction with completing RS pre-session activities**

4.2.2 Tasks

4.2.2.1 Time on task

The time on task was calculated for eight of the nine participants who used the music prototype and three of the four participants who used the game prototype (Table 7). Time on task was not calculated for the remaining participants because the video was not successfully recorded and times could not be found.

**Table 7: Time on task in the RS method (seconds)**

<table>
<thead>
<tr>
<th></th>
<th>Music prototype (8 of 9 participants)</th>
<th>Game prototype (3 of 4 participants)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>SD</td>
</tr>
<tr>
<td>Task 1</td>
<td>180.17</td>
<td>1.94</td>
</tr>
<tr>
<td>Task 2</td>
<td>146</td>
<td>0.95</td>
</tr>
<tr>
<td>Task 3</td>
<td>138.3</td>
<td>0.8</td>
</tr>
</tbody>
</table>
4.2.2.2 **Task Difficulty Ratings**

All participants completed the task difficulty rating survey questions for the music and game prototypes (Appendix D: Figure 9). More than 60% of participants “strongly agreed” or “agreed” that each task in the music and game prototypes for the RS method were easy to complete (Figure 30). Approximately 25% of participants strongly disagreed that Task 1 in the music prototype was easy to complete. And approximately 25% of participants disagreed that Task 3 in the music prototype and Tasks 2 and 3 in the game prototype were easy to complete.

Two participants were confused by the wording of Task 1 in the music prototype. One participant did not understand how she had “saved” songs on the website. The second participant was unsure whether “listening to two saved songs” referred to the songs he searched for in Task 2 (which he performed first). One participant was confused by the wording of Task 2 in the game prototype. The participant started Task 2 and motioned to chat with her friend (to successfully complete the task) when she re-read the task and thought it meant rather to actually start a game with the friend.

*Figure 30: Task difficulty ratings in the RS method*
4.2.3 Usability Issues Discovered

A total of fifty-five non-unique usability issues were discovered in the music prototype and twelve in the game prototype among all participants (Table 8). The most discovered usability issue categories in the music prototype were issues relating to confusing search capabilities (fifteen issues), organization (twelve issues), and lack of confirmation notices (seven issues). The most discovered usability issue categories in the game prototype were confusing terminology (ten issues), confusing organization (one issue), and wrong expectations (one issue).

Participants were asked to rate their level of agreement with various statements about the website prototype they used in the RS session (Figure 31). More than 50% of participants felt the prototype was easy to use and navigate, although approximately 90% of participants agreed they had to ask for help to use the prototypes, approximately 45% felt the prototypes did not match their goals, and 25% felt they needed a higher level of interaction to understand the website. Approximately 90% of participants stated they felt the terminology was not confusing which contrasts with the ten times terminology usability issues were found in the game prototype.

Table 8: Non-unique usability issues discovered in the RS method

<table>
<thead>
<tr>
<th>Issue</th>
<th>Music prototype</th>
<th>Game prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Confirmation</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Content labeling/Iconography</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Cosmetic</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Expectations</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Lost</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Manipulation</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Prototype</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Scope</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Search</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Start function</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Terminology</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>12</td>
</tr>
</tbody>
</table>
Approximately 10% of the usability issues in the music prototype were “catastrophic” (Figure 32). “Minor issues” made up approximately 41% to 55% of the issues in the music prototype. “Cosmetic issues” made up less than 10% of the issues in the music prototype.

For the game prototype, approximately 65% of the usability issues were “major issues”. The remaining 35% were “cosmetic issues”.

Figure 31: Level of agreement with statements about the prototype in the RS method

Number of respondents = 12

- Felt comfortable talking about the information on the website
- More detail needed to understand the website
- Level of interaction and choices was just right
- Website does not match my goals
- Language and terms were confusing
- Website overall was easy to use
- Needed to ask others for help to use the website
- Used the website in the most efficient manner
- Navigation was easy to understand
- Easy to find the right information

% of respondents

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Figure 31: Level of agreement with statements about the prototype in the RS method
4.2.4 Prototype

Several participants searched for the interactive elements in the prototype to figure out how to use the website and complete the tasks. One participant read the task and clicked around the page and said, “Can you click that...or...ok, I'm confused. What can't you click? Ohh, ok, I see you can only click the certain ones [page elements] for the task anyways.” A second participant expected a search box to appear in a particular part of the page and when he found it and discovered it was not clickable, he discovered a second search box that was interactive and said he knew to use the interactive one. A third participant stated, “Oh, there's two 'Rocks' [playlists]. Well, this one's clickable, so I'll do [use] that.”

The moderator stated that most elements of the prototype were not interactive and that the participant should describe elements on the website they would want to interact with or areas of the website they would expect to use in order to complete the tasks. Regardless of this disclaimer, participants either exclusively looked for interactive elements to complete the tasks or felt they had not completed a task until they believed an interactive element had led them to their end goal.
Navigation and level of interaction were the most confusing characteristics of the game and music prototypes in the RS session (Figure 33). Four participants felt the level of interaction was “just right” for the music prototype (Figure 34). Although contradictory, seven participants felt the prototypes had the right level of interaction, while six participants felt the prototypes required more detail to be understood.

4.2.5 Post-session

Twelve participants responded to the post-session survey (Appendix D: Figure 10). Five participants were “very satisfied” and seven participants were “satisfied” with completing the post-session activities (Figure 35).

![Figure 33: Most confusing characteristics of the prototypes in the RS method](image)
"More detail was needed to understand the website."

Number of respondents = 12

Figure 34: Participants’ level of agreement with the amount of detail in the prototypes in the RS method

Participant satisfaction with completing the RS post-session activities

Number of respondents = 12

Figure 35: Participant satisfaction with completing the RS post-session activities
4.3 Remote Asynchronous Testing Method

Eleven participants attempted the RA session: nine participants completed the entire RA session and two participants completed half of the RA session. It took participants approximately eighteen hours and fourteen minutes on average to complete the RA session (Table 9). A time for the pre-session and post-session could not be determined. It took participants approximately two minutes on average to complete the tasks.

Table 9: Time to complete each part of the RA method (minutes)

<table>
<thead>
<tr>
<th>Session Part</th>
<th>Average</th>
<th>Min</th>
<th>Max</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-session</td>
<td>1097</td>
<td>3.68</td>
<td>4667.27</td>
<td>1700.97</td>
</tr>
<tr>
<td>Tasks</td>
<td>2.24</td>
<td>2.24</td>
<td>4.15</td>
<td>1.48</td>
</tr>
<tr>
<td>Post-session</td>
<td>1097</td>
<td>3.68</td>
<td>4667.7</td>
<td>1700.97</td>
</tr>
<tr>
<td>Total</td>
<td>1097</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Four participants found it very convenient to be able to participate in a usability test from home without having to travel to a physical location. One participant stated it was convenient to “provide...feedback from home without the hassle of having to travel to a physical site.” One participant commented on the convenience of completing the test at any time. When asked what they liked least about the method, one participant stated, “Nothing, really. It was fun!”

These same participants also commented on the difficulty of recording their audio and video (Figure 36). Several participants had trouble using the ScreenCastle website and Krut Screen Recorder. Details about their experience are discussed in the Pre-session section below.

Participants were “Very satisfied” and “Satisfied” with thinking aloud during the RA sessions (four participants and three participants, respectively) (Figure 37). One participant was dissatisfied with thinking aloud during the RA session. One satisfied participant stated, “I had to try and think of questions that the test moderator would have asked if they were present.”

Seven participants were “Very satisfied” or “Satisfied” with the time it took to complete the RA session. The other two participants were dissatisfied. One of the dissatisfied participants took more than two and a half hours to complete the entire RA session from the pre-session activities to submitting the video recording. The other dissatisfied participant took twenty-one days to start the pre-session activities and successfully submit the video recording. This
participant had trouble uploading their video to the survey and had to work with the moderator to find a way to transfer the 433 megabyte file.

![Graph](image)

**Figure 36: Satisfaction with activities in the RA method**

![Graph](image)

**Figure 37: Level of agreement with statements about the RA method**
4.3.1 Pre-session

Nine participants were “satisfied” or “very satisfied” with completing the pre-session activities (Figure 38). One participant was “neutral” about completing these activities.

Participants used three methods for submitting the recording of the RS session (Figure 39). A majority of the participants (seven out of ten participants) submitted a link to their recording on the ScreenCastle website, while three participants recorded the session on his or her computer and sent the file directly to the moderator. These three participants could not upload their file to the survey because SurveyGizmo limits uploaded files to fifty megabytes in size. One participant uploaded the file to their personal website and emailed the moderator a link to download the file. The remaining two participants uploaded their file to the moderator's personal website via an FTP account.

![Figure 38: Participant satisfaction with completing RA pre-session activities](image.png)
All ten participants completed the pre-session survey (Appendix D: Figure 8). One participant stated that “The Screencastle website was very simple to use,” while others had different feelings of satisfaction about recording their session. Six participants had trouble recording the audio and video. Participants reported that the “option used to record the session was a bit tricky” and that the “screen recording was frustrating to figure get working [sic], and I still don't think it worked.” One participant had a very difficult time getting all the pre-session activities to work and stated:

“Too long to download and install software. I needed to download and install java and the screen recording app. After I installed java, my flash plugIn [sic] for firefox [sic] stopped working and I could no longer watch the youtube [sic] tutorial. I tried restarting firefox [sic] several times but that didn't work. I reinstalled the flash plug in but that didn't work either. So I finally had to reboot. That worked. Over all that took about 30 minutes. The entire session took over an hour including start to finish.”

A second participant also found it difficult to use the ScreenCastle website to record her session. The moderator emailed the participant trying to figure out how to record her session using the tool, but could not get it to work successfully. Since more participants were likely to have issues with the ScreenCastle website, the moderator added instructions and a video tutorial on how to use the Krut Screen Recorder to record their RA session.
4.3.2 Tasks

4.3.2.1 Time on task

Time on task was calculated for two of the four participants that used the music prototype and six of the seven participants who used the game prototype (Table 10). Not all participant's time on task could be calculated, because participants were not able to supply a video recording of their session.

Table 10: Time on task in the RA method (seconds)

<table>
<thead>
<tr>
<th></th>
<th>Music prototype (2 out of 4 participants)</th>
<th>Game prototype (6 out of 7 participants)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Task 1</td>
<td>108</td>
<td>1.27</td>
</tr>
<tr>
<td>Task 2</td>
<td>31</td>
<td>0.14</td>
</tr>
<tr>
<td>Task 3</td>
<td>179</td>
<td>1.13</td>
</tr>
</tbody>
</table>

4.3.2.2 Task Difficulty Ratings

Three of four participants completed the task difficulty rating survey questions for the music prototype and five of seven participants completed the task difficulty rating survey questions for the game prototype (Appendix D: Figure 9).

100% of participants “strongly agreed” or “agreed” that Task 1 for the music and game prototypes were easy to complete in the RA method (Figure 40). 65% of participants strongly agreed or agreed that Task 2 in the music prototype was easy to complete, while the remaining participants were neutral about whether Task 2 in the music prototype was easy to complete. 75% of participants strongly disagreed or agreed that Tasks 2 and 3 in the game prototype were easy to complete.
4.3.3 Usability Issues Discovered

A total of eighteen non-unique usability issues were discovered in the game prototype and nine in the music prototype among all participants (Table 11). The most discovered usability issue categories in the music prototype were issues relating to confusing scope (three issues); confusing organization (two issues); lack of affordances (one issue), confusing content labeling and iconography (one issue), confusing search (one issue), and confusing terminology (one issue). The most discovered usability issue categories in the game prototype were issues relating to confusing terminology (eleven issues); wrong expectations (two issues); and confusing organization (one issue), lack of confirmation (one issue), performing the right action in the wrong context (one issue), cosmetic (one issue), and getting completely lost (one issue).
### Table 11: Non-unique usability issues discovered in the RA method

<table>
<thead>
<tr>
<th>Issue</th>
<th>Music prototype</th>
<th>Game prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordance</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Organization</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Confirmation</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Content labeling/Iconography</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Context</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cosmetic</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Expectations</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Lost</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Scope</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Search</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Terminology</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

Participants were asked to rate their level of agreement with various statements about the website prototype they used in the RA session (Figure 41). 45% of participants “Agreed” that both prototypes were easy to use overall and 55% were neutral about the websites' overall ease of use. Approximately 55% felt the navigation was easy to understand and 88% felt it was easy to find the right information. 20%-25% felt he or she needed more interaction and detail in the prototypes to understand the website. 45% needed to ask others for help to use the site.

55% of the usability issues in the music prototype were “major issues” (Figure 42). “Minor issues” made up the remaining 45%. 15% of the usability issues in the game prototype were “catastrophic” issues. The remaining usability issues in the game prototype 85% were “major issues”.

#### 4.3.4 Prototypes

The music prototype was most confusing in the RA session (Figure 43). The features and concepts of the game website were most difficult to understand and three participants felt that more detail was needed to understand the game prototype (Figure 44).
Figure 41: Level of agreement with statements about the prototype in the RA method

Number of respondents = 9

- Felt comfortable talking about the information on the website
- More detail needed to understand the website
- Level of interaction and choices was just right
- Website does not match my goals
- Language and terms were confusing
- Website overall was easy to use
- Needed to ask others for help to use the website
- Used the website in the most efficient manner
- Navigation was easy to understand
- Easy to find the right information

Figure 42: Usability issues by severity rating in the RA method

Usability issue severity rating by prototype in the RA method

- 4 – Catastrophic
- 3 – Major issue
- 2 – Minor issue
- 1 – Cosmetic problem
Figure 43: Most confusing characteristics of the prototypes in the RA method

Figure 44: Participants' level of agreement with the amount of detail in the prototypes

"More detail was needed to understand the website."

"Strongly agree" "Agree" "Neutral" "Disagree" "Strongly Disagree" "Not Applicable"
4.3.5 Post-session

Nine participants responded to the post-session survey (Appendix D: Figure 10). Two participants were “very satisfied” and seven participants were “satisfied” with completing the post-session activities (Figure 45).

Figure 45: Participant satisfaction with completing the RA post-session activities

Number of respondents = 9

Very Satisfied
Satisfied
Neutral
Dissatisfied
Very Dissatisfied
Not Applicable
Chapter 5. Discussion

Remote usability testing is an important part of the usability professional's toolkit. This study was an attempt to shed light on RS and RA remote usability testing methods to help designers choose the right methods for their goals. The study's methodology was largely incomplete based on the number of participants involved and the data they provided for the RA sessions. Thirteen participants participated in total. All thirteen completed the RS sessions and only nine participants completed all parts of the RA session.

In this study each part of the remote usability test was compared. RA sessions took considerably longer to complete than RS sessions, and for several participants, took days to complete. Some participants' attitude toward parts of the RA session, such as thinking aloud, recording their video and audio, and using the online guide was negative, however, participants only responded negatively to the online guide used in the RS session. Usability issues on organization of concepts and UI elements, searching for information, and confusing or unrecognizable terminology were the usability issues most discovered. Issues with terminology were most consistent in that they were found in the game prototype in both remote methods (ten in RS and eleven in RA). The level of interaction in the prototypes presented an interesting problem. Several participants searched for the interactive elements to figure out how to complete the tasks or tried completing the tasks regardless of interactivity but were eventually swayed by the focus on interactive elements. 100% of participants would participate in a RS session in the future while only 65% of participants stated they would participate in an RA session in the future.

When participants were asked which method they prefer and why, five of the eight participants who successfully completed both session stated that they prefer the RS session because they were able to talk with a moderator during the session. One participant stated he was better able to understand the intentions of the study by speaking with a moderator. Two participants stated they liked talking with the moderator because they were reassured that they were providing quality feedback.
Two participants stated they preferred the RA session because they could complete it at their own convenience. And one participant had no preference toward either remote method.

When asked which remote method they found most convenient, five of the eight participants indicated they found the RA session more convenient than the RS session. While one participant found the RA session more convenient, they felt strongly about having a live person on hand to answer questions:

“The un-guided session was more convenient because I could work at my own pace. However [sic], the live moderated session allowed for feedback to areas of concern. For instance, if the participant has a question concerned with the wording of the task or with components of the prototype, sometimes it's better to have a live person to ask.”

One participant found the RS session more convenient and one participant had no preference. When asked which remote method they found most comfortable, half of participants felt the RS session was more comfortable and the remaining half felt both methods were equally comfortable. Zero participants felt that the RA session was outright more comfortable than the RS session.

### 5.1 Usability Issues

Participants using the music prototype found the most non-unique issues among all participants in the RS session. Participants in the RA sessions using the music prototype discovered the least number of non-unique issues in total. And the game prototype across both remote methods was fairly close (twelve in RS, eighteen in RA). The top three usability issues discovered the most were: navigation organization, search, and terminology. Unclear and confusing terminology was the only consistent issue across both remote methods.

The usability issues found in the game prototype using the RA method were much more severe than the usability issues found in the game prototype in the RS method. Catastrophic and cosmetic issues were found in the music prototype using the RS method, but not the RA method.

Five of eight participants that completed both the RA and RS session indicated they preferred the music website over the game website. Participants preferred the music website because they are more likely to use music than game websites (two participants), they like the concept of the music website (one participant), and it was “simpler and easier to navigate.”
Those preferring the game website thought it was more intuitive and easier to use. One participant preferred to visit the game website because they would “be more likely to check out that site then [sic] to find a new music website,” implying that this participant already frequents a more favorable music website.

5.2 Limitations and Recommendations

5.2.1 Participant Recruitment

Participants were recruited in June and July during a time when most students at RIT were at home away from the university. This made it very difficult to find enough participants for the study. Many participants who were initially interested toward the beginning of the summer were no longer interested when the moderator contacted them weeks later.

5.2.2 Uncontrolled Remote Environment

The goal of this study was to test participants in their own remote environment, but remote conditions proved to be too inconsistent. Because this study was conducted in an uncontrolled environment, it would be interesting to conduct this same study again in a controlled, lab environment that simulates the two remote methods presented here. Conducting the study in a lab environment would help standardize the software and hardware constraints of each participant. A lab environment would ensure that all participants complete both RS and RA sessions.

5.2.3 Usability Issues

It is difficult to compare the usability issues across both methods and prototypes since an uneven number of participants tested each scenario, although the results of this study show that more usability issues were found in the RS method. While participants liked the convenience of the RA method, they liked talking with the moderator who could provide real-time guidance to answer any questions they might have. The RA method is far more convenient for the usability
professional with little time to devote to actual usability testing and the RS method is better suited for discovering more usability issues and to answer participants' questions in real time.

5.2.4 Prototype Level of Detail

The prototype in a remote usability test should include as much detail and interaction needed to complete the desired tasks, but also enough detail to prevent participants from relying too heavily on the elements that are interactive. When a prototype focuses on a set of functions in their entirety (functions are more scripted with specific paths to completing tasks), participants feel there is a “right” way to do things and look for the specific elements that are interactive rather than exploring the prototype. It would interesting to explore this topic even further by conducting a study to determine how prototypes with various levels of detail influence the usability issues discovered in remote usability testing.

5.2.5 Tasks

Several participants were confused by or misunderstood the tasks. Tasks should not contain any ambiguous wording and should be written with enough detail to give the participant enough context to complete the task in the way it was intended by the researcher.

Tasks 2 and 3 for the game prototype were more difficult in the RA method than the RS method and may be a result of confusing task wording, prototype usability issues, and lack of real-time guidance from the moderator.

5.2.6 Technology

Several participants had trouble recording their screen using the recording software and sending the recorded file to the test moderator. Either the participant did not have the required pre-requisites on their computer to use the software or they could not upload the file to the survey. Any software used in the test should comply with the participants' existing software and hardware or instructions should be given to participants with adequate time to acquire and learn how to use such software. More work should have been done to assess the participant's remote environment to determine the best method for conducting the usability tests.
5.2.7 Total Test Time

Time to complete tasks for the RA sessions were similar to the time to complete tasks in the RS session, but the RA sessions took longer overall. Usability professionals should be aware that while a moderator is not needed to perform the usability tests, that participants might take longer to return all test documents and recordings.
Chapter 6. Conclusion

This pilot study was an attempt to shed light on how asynchronous and synchronous remote usability tests influence the quantity, type, and severity of usability issues discovered in low-fidelity prototypes, how much time and assistance is required to conduct remote usability testing, and the participant experience with both methods.

Based on the results of this study, the quantity, type, and severity of usability issues varied between the RS and RA methods. Participants required more time to fully complete the RA method than the RS method and found it to be more convenient. Although more convenient, participants liked the assistance of a moderator that could provide guidance in real time. Several participants had trouble recording their screen and audio while completing the tasks, because participants did not have the right computer hardware or software, or the recording technology was too difficult to learn how to use. Several participants had trouble with various aspects of the RA method, such as thinking aloud, recording the screen and audio, using the online guide, and knowing what to do to complete the entire session.

While the RA method does not require a test moderator and participants find it more convenient to complete the test whenever he or she chooses, participants may require clarification on tasks and usability issues discovered during the test. Participants were also more critical of the RA method and sometimes found it difficult to complete the entire session on his or her own time without anyone to guide them.
Acknowledgments

I am very grateful to my adviser, Dr. Evelyn Rozanski, for all her help and expertise in exploring this topic. I am also grateful to Jill Hewitt for her help and expertise in usability testing. I would also like to thank all the participants in the usability tests, who were integral to conducting this study.
References


## Appendix A. Remote online testing services

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Appendix B. Heuristic evaluations

The following rating scale has been used to rate each heuristic:

- 5: Meets heuristic
- 4: Almost meets heuristic (some minor issues)
- 3: Neither bad nor good
- 2: Some problems not readily noticeable
- 1: Major issues

Heuristic Evaluation for Grooveshark

1. Visibility of system status, Score: 4 (Not very noticeable)
   The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
   System status is largely the indication that a song is playing, paused, loading, or stopped in the form of the traditional music player moving point along the song timeline indicating the current position in the song. Other less noticeable status indicators include messages that appear in the bottom right corner of the page that popup to tell the user whether songs have been added to the library or playlist or have been deleted.

2. Match between system and the real world, Score: 2 (While terms are familiar, the playlist, library, and song queue concepts are confusing)
   The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
   The terms used on the site are typical for this user group. Words such as “playlist”, “library”, “community”, “music”, “song”, “listen”, and “radio” are commonly used terms and recognizable. The term “metadata” which is used to describe information about a song, may not be as recognizable as the previous terms. The site has three competing concepts used to manage the user’s collection of music: “playlists”, “currently playing songs” (I call it the song queue for short), and the user’s library (“My Music”). When searching for songs in the larger Grooveshark community, songs can be added to each of these three locations, but only placing them in the song queue allows the user to directly play the songs. Placing songs in this queue is required to play songs from the library and playlists. New songs can be placed in the song queue without being saved to either the library or playlists. This queue acts as an intermediary step between playing the songs play and storing the songs in the user’s account for later use. Songs that appear in the library are exclusive of songs that appear in the playlists. A song can be added to the library from a playlist by clicking a button that looks like a plus sign with no other indications of what it is used for.

3. User control and freedom, Score: 1 (Too many controls and choices adds to the confusion of the playlists, library, and song queue)
   Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
   The site offers users a core set of controls offered in several different locations, often seeming redundant. Core controls include moving songs between the three storage concepts (listed above in Heuristic #2), deleting songs, sharing songs with Grooveshark community members, and buying songs from external e-commerce websites. Deleting songs and moving songs between the three areas can pose problems because the three areas are differentiated in the user interface to perform area-specific functions.

Managing playlists in the “sidebar” is unclear. There is an option to hide a new playlist from the sidebar, but it is unclear where the playlists reside that do not appear in the sidebar.
4. Consistency and standards, Score: 4 (Nice consistent use of page layout, but inconsistent system feedback)

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

The website consists of a one-screen framework with four areas (top, left, main, and bottom) where content is displayed and replaced. The layout remains consistent while searching for and managing music, as well as managing one’s account. The layout is similar to that of iTunes where the playlists appear on the left side and the main content appears in the central area to the right of the playlists.

The status indicators are also not consistent with each other. When deleting a song or playlist, or moving a song from community search results to a playlist, several different outcomes may occur. When deleting a song from a playlist, a line appears drawn through the song title to indicate it will be removed. Once the user manually saves the changes to the playlist, the songs are removed with no indication that they have been deleted. When deleting a playlist, a modal popup box appears asking the user if they want to complete the action. And when moving a song from search results to a playlist, a message appears in the bottom right corner of the page. Each of these three cases shows that there are inconsistencies for notifying the user when actions are taken. These inconsistencies will confuse users on where to look to get appropriate system feedback.

5. Error prevention, Score: 5 (Aside from the one noticeable lack of an error message, pop up boxes regularly appear when permanent changes such as deletion are made)

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

A modal popup box appears when certain actions are performed, such as when deleting a playlist or switching between playlists without saving the currently viewed playlist. A popup box does not appear when the user chooses to delete all songs from the queue. Combine this with an icon that can be confused with the playlists, and it becomes unclear what the button does and the user can accidentally delete all the songs in their song queue.

6. Recognition rather than recall, Score: 2 (Site relies heavily on hidden features via hovering over or clicking on elements)

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

The site relies heavily on recall rather than recognition. Many of the site’s core functions are hidden as commands that appear when the user hovers or clicks an aspect of the user interface. When the user hovers over a song they get options to move it, add it to a playlist, share it with a friend, buy it, or “flag” it. And when a user hovers over a playlist or radio station, there is the option to delete it. Similar functions exist when a user hovers over a song in a playlist, except the options are also available as buttons at the top of the screen, but the user must remember to first click the song before clicking any of the buttons or to see additional buttons for more functionality.

7. Flexibility and efficiency of use, Score: 5 (Good use of options for different levels of experienced users)

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Less experienced users can click songs and use the buttons at the top of the site to perform actions such as playing songs and adding them to playlists. More experienced users can bypass the use of the buttons and directly drag-and-drop songs between playlists and the song queue.

8. Aesthetic and minimalist design, Score: 3 (Well organized but lots of replicated information)

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

While the design of the site is very clean and organized, the design is far from minimalist. Much of the information about songs in the song queue is replicated in the playlist. When the user clicks on a song in a playlist, even more buttons appear in the top navigation. The number of buttons seems excessive and could be reduced to a smaller, condensed set. The site seems overwhelming and is very busy at times.
9. Help users recognize, diagnose, and recover from errors, Score: 5 (Instant and clear indication of errors)

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

The only error message encountered is during login. When an incorrect username or password is supplied in the modal popup box, a message is clearly displayed in red at the very top of the box to indicate that an error has occurred. The user can then re-enter their information.

10. Help and documentation, Score: 1 (Poor search results, which are at the heart of any help system)

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

The help and documentation is accessible via the user’s login name at the top right corner of the site. The help area of the site is also very well organized and has a pleasing UI. The user is greeted by a very large search box making it easy to quickly search for answers. The only problem is that answers are not always available. For example, when doing a search on the “sidebar”, the only result returned is on how to delete a playlist, which is not helpful at all. The results are also returned based on operating system. All results are displayed in list format, which is cumbersome to search when the user may only be using a desktop OS – the user has to scour the list to find results relevant to their OS. A way to view selected OS’s would be very helpful here and reduce search time.

11. Accessibility, Score: 1 (No noticeable alternatives to major site functions)

Affordances should be made available to users of assistive technology to provide create an experience as close to the intended one as possible.

This eleventh heuristic is missing from Nielsen’s list and is included here since it is a major topic of modern web design and can prove to exclude a large number of users. Grooveshark was built with Javascript. The W3 does not offer any specific guidelines for Javascript accessibility, but the W3 general list of accessibility standards can be followed (W3, 1999). This heuristic cannot be tested in its entirety as I do not have a screen reader available, but according to the standards, the site may fail standards for accessible alternatives. The site requires users to either use the mouse or hover options which do not appear to have other alternatives. For example, songs are moved around and managed by dragging and dropping or by clicking Javascript menus. A lack of alternatives for screen readers can pose major problems and hinder use of the site.
Heuristic Evaluation for Omgpop

1. Visibility of system status, Score: 5 (Good use of system status messages and time to display such messages)
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
The site does a good job at keeping the user aware of what is happening. Modal popup boxes are typically used to indicate system status. As the user chooses a game to play, popups are instantly displayed which indicate that saved game data is loading, “game libraries” are loading, and that servers are being accessed. They quickly disappear once the introductory page for the game has loaded. System status is also clear when all other users leave a game and you are left as the host. A message appears at the top of the page which indicates you are now the host and then fades away. This same type of message appears when other types of errors occur as members convene to join a game. It is unclear whether these errors are server related or due to other users leaving a game.

2. Match between system and the real world, Score: 5 (Terms and concepts are familiar)
The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order. Most terms are familiar to the targeted audience. Terms such as “play”, “match”, “bet”, “shop”, “profile”, “invite”, “opponent”, “activity”, “achievements”, among many others are familiar terms. The only term that would seem most unfamiliar is “server” when it appears in a popup box indicating a loading game. Most concepts are logical. Users find a game, choose to join an existing game or create a new one, wait for other members to join the game, play the game, receive a ranking of player performance (winners/losers), and restart the game. Finding and communicating with friends also exists in a logical manner.

3. User control and freedom, Score: 2 (Lack of sense of control as too much information can quickly begin to crowd the interface)
Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo. When first visiting the site, the use of modal popup boxes can disorient the user with the amount of information presented and control granted. Many options appear in these boxes as people begin to communicate with the user and as the system status is continually updated. A feeling of a lack of control can ensue. It would be helpful if settings were available to deactivate or lessen the amount of popup messages that appear.

4. Consistency and standards, Score: 3 (Good use of consistency across game pages, little variance, although inconsistent use of modal popup messages and error messages, also inconsistent use of member functions)
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions. The site is mostly consistent. The user is presented with a starting dashboard when they login that presents links to popular games. The site is divided up by game where each game has its own page with a structure that is similar across each. Two areas where inconsistencies appear are with the use of the modal popup boxes that display general and error message and with core member functions available when hovering over a member’s avatar. Messages appear at the top of the screen, at the bottom left, in the center of the screen, and at the top left. And member actions are different depending on the context of waiting for a game to start or during gameplay. It is difficult to remember what options are available and in what context. Because the site heavily relies on social computing, these functions should be consistent to facilitate quick and easy communication.

5. Error prevention, Score: 5 (Good use of modal popup boxes to prevent errors)
Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
A typical error is switching pages in the midst of waiting for a game or as a game is occurring. This error can be prevented when the modal popup box appears and asks the user if they want to switch to the new page or stay on the current page.

6. Recognition rather than recall, Score: 5 (Good balance between recognition and recall)
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

There are three main areas where recall is used: member functions are available by hovering over a person’s avatar, additional descriptive help available by hovering over elements on the page, and core user functions available via an always visible toolbar at the bottom of the screen.

7. Flexibility and efficiency of use, Score: 1 (Hard to find instructions and little efficiency for experienced users)

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

The site is not very friendly for inexperienced users and contains few shortcuts for efficiency of use. Visual instructions on how to play the games occasionally appear in the top, right box of the page, but this is sporadic and it is unclear that these are in fact instructions at first glance. More detailed instructions are available via a tab above the large graphic on each game lobby page. But this tab is small and light grey with white text which is very hard to see among all the other graphics and information on the page.

As discussed in the third heuristic above, there is a sense of loss of control as the amount of information presented can be overwhelming. There are no settings to prevent modal popup boxes from appearing by default. For example, when another member sends a message via the chat, the box is automatically displayed on screen. To give more control to the user, the user could modify settings to automatically have the chat boxes minimized versus appearing on screen. This would return some of the page real-estate back to the user during game play and increase the sense of control. Other messages, such as quiz questions also appear on screen frequently and can also decrease the sense of control. Settings for these messages would also help restore control.

8. Aesthetic and minimalist design, Score: 1 (Design is very complex and cumbersome at times, leads to very slow load time)

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

The design is anything but minimalist! Each page is filled with colorful graphics that span the entire page. The graphics and animations that appear on the user’s dashboard immediately after logging do not seem suited to the concept of a dashboard or promote efficiency of use for experienced users. Large animated graphics feature three of the games with a sliding list of games at the bottom of the dashboard. The page is consumed by this display and does not let the user take control of this personal space. A suggestion is to let users mark games as favorites and to have them appear here on the dashboard for quicker access to users’ most played games.

A similar problem exists on the introductory page for each game. The page is consumed by a large graphic that depicts the game name with a leaderboard at the bottom of the page. Playing games and communicating with friends are key features of the site and these functions should be emphasized on a page such as this. The box to the right of the large introductory graphic featuring a list of currently available games, friends who are currently playing games, and recent opponents could take back some of this space to facilitate the goals of the site. More space could also be allotted to instructions on game play as these are also hard to find.

All of the graphics and animations lead to very slow page load time. The amount and colorfulness of the graphics are well suited for the target audience and promote a feeling of arcade style gameplay with flashy visuals. The site does have a button to toggle lower graphics quality at the bottom right corner of every page, but even this option does not help overcome lagging page load time when users are on a slower Internet connection.
9. Help users recognize, diagnose, and recover from errors, Score: 5 (Overall good use of error recovery)

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Modal popup boxes appear when errors occur. These boxes appear in two forms: a box will fade in and out at the top of the screen when the user is waiting for other members to join a game and the game unexpectedly quits and a box will appear in the bottom left corner when the user is disconnected from the Internet. In the first case, there is no explanation why the error has occurred or what the user can do about it. In the second case, the user is given a chance to recover from the error. When disconnected from the Internet, the user is given the option to reconnect to the site’s chat server. And when in the midst of waiting for a game to commence or in the middle of a game, the user can choose to stay on the current page or progress to the new page.

10. Help and documentation, Score: 4 (Good use of social computing to provide robust forum for help, lacks in-game support)

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Several elements on the page provide additional help when the user hovers them. When the user hovers over a medal, additional text is displayed above the medal to explain its role. As discussed in the seventh heuristic above, game play instructions are hidden among other flashier visuals. Additional help documentation is available via the “Info” drop down menu at the top left of the page. The “Help & Faq” option is buried among the other options in the drop down menu. To promote ease of use, this menu should ideally contain 7±2 items. The “Help & Faq” section is an orderly list of questions and responses. Questions are aptly related to the site’s content, but are not easily searchable. The use of a search box would help alleviate this problem. The lack of robustness of the Help & Faq section is solved by an active forum located in the Feedback section of the site where users can communicate with each other to solve site issues. This is a good use of social computing, as it is intimately at the heart of the site, and provides an organic means to solve problems. While the out-of-game help is full of social commentary, the in-game help is heavily lacking. It is hard to find and inadequate at explaining the full rules of the game.

11. Accessibility, Score: 1 (Relies heavily on color and animation to convey information)

Affordances should be made available to users of assistive technology to provide create an experience as close to the intended one as possible.

This eleventh heuristic is missing from Nielsen's list and is included here since it is a major topic of modern web design and can prove to exclude a large number of users. Omgpop was created with Adobe Flash and is inaccessible according to Adobe’s Flash accessibility design guidelines (Adobe, 2011). The site does not allow users to control motion, provide captions or descriptive text for all elements, or use color wisely. This heuristic cannot be tested in its entirety as I do not have a screen reader available, but the site relies heavily on the use of color and animation to convey information which can be highly problematic for assistive technologies. The heavy use of color can also be highly problematic for users with color disorders. As a suggestion, the site should allow for customization of these colors to accommodate these users.
## Appendix C. Participant profiles

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<td>Graduate student</td>
<td>25</td>
<td>Stream online; online radio; AM/FM receiver; music stored on own computer; digital device</td>
<td>15</td>
<td>Role playing, first person shooter, racing, puzzles</td>
<td>20</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Heard about HCI topics</td>
</tr>
<tr>
<td>6</td>
<td>18-35</td>
<td>Graduate student</td>
<td>28</td>
<td>Stream online; music stored on own computer; digital device</td>
<td>20</td>
<td>Role playing, first person shooter, real time strategy, puzzles, board games</td>
<td>20</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Studying HCI and is an HCI professional</td>
</tr>
<tr>
<td>8</td>
<td>18-35</td>
<td>Undergraduate student</td>
<td>27.5</td>
<td>Information not collected.</td>
<td>10</td>
<td>Information not collected.</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Read HCI topics</td>
</tr>
<tr>
<td>9</td>
<td>18-35</td>
<td>Graduate student</td>
<td>4</td>
<td>Stream online; satellite radio; online radio; AM/FM receiver; music stored on own computer; digital device</td>
<td>4</td>
<td>Real time strategy, puzzle, board games</td>
<td>5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No experience</td>
</tr>
<tr>
<td>10</td>
<td>18-35</td>
<td>Undergraduate student</td>
<td>8</td>
<td>Stream online; AM/FM receiver; music stored on own computer; CDs, cassette tapes, vinyl</td>
<td>10</td>
<td>Role playing</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No experience</td>
</tr>
<tr>
<td>ID</td>
<td>Age</td>
<td>Current education level</td>
<td># of hours spent online per week</td>
<td>Sources used to listen to music</td>
<td># hours listened to music in the past 1 week</td>
<td>Types of games played</td>
<td># hours played games in the past 1 week</td>
<td>Visited Grooveshark in the past 1 month?</td>
<td>Visited game Omegpop.com in the past 1 month?</td>
<td>Experience with HCI</td>
<td>Experience with usability testing</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>-------------------------</td>
<td>----------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------------------</td>
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<td>------------------------------------------</td>
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<td>---------------------------------------------</td>
<td>----------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>18-35</td>
<td>Graduate student*</td>
<td>16</td>
<td>Stream online; online radio; AM/FM receiver; music stored on own computer; digital device</td>
<td>10</td>
<td>Role playing, real time strategy, puzzles, board games</td>
<td>3</td>
<td>No</td>
<td>No</td>
<td>Is an HCI professional</td>
<td>Has been a participant in 2 times in the past</td>
</tr>
<tr>
<td>23</td>
<td>18-35</td>
<td>Graduate student</td>
<td>21.5</td>
<td>AM/FM receiver; music stored on own computer</td>
<td>3</td>
<td>Racing, puzzle</td>
<td>3</td>
<td>No</td>
<td>No</td>
<td>No experience*</td>
<td>Has been a participant once in the past</td>
</tr>
<tr>
<td>24</td>
<td>18-35</td>
<td>Undergraduate student</td>
<td>12</td>
<td>Stream online; satellite radio; online radio; AM/FM receiver; music stored on own computer; digital device; CDs, cassette tapes, vinyl</td>
<td>6</td>
<td>Role playing, sports, racing, puzzles, board games</td>
<td>3</td>
<td>No</td>
<td>No</td>
<td>No experience</td>
<td>Has never been a participant before</td>
</tr>
<tr>
<td>25</td>
<td>36-52</td>
<td>Graduate student</td>
<td>85</td>
<td>Stream online; online radio; AM/FM receiver; music stored on own computer; digital device</td>
<td>40</td>
<td>First person shooter, sports, racing, puzzles, arcade</td>
<td>3</td>
<td>No</td>
<td>No</td>
<td>Studying HCI and is an HCI professional*</td>
<td>Has been a participant once in the past</td>
</tr>
<tr>
<td>4</td>
<td>36-52</td>
<td>Graduate student</td>
<td>15</td>
<td>Online radio; AM/FM receiver; digital device; CDs, cassette tapes, vinyl</td>
<td>5</td>
<td>Puzzles</td>
<td>3</td>
<td>No</td>
<td>No</td>
<td>Studying HCI*</td>
<td>Has been a participant once in the past</td>
</tr>
<tr>
<td>30</td>
<td>18-35</td>
<td>Undergraduate student</td>
<td>16.5</td>
<td>Stream online; AM/FM receiver; music stored on own computer; digital device; CDs, cassette tapes, vinyl</td>
<td>6</td>
<td>Sports, racing, puzzles</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No experience</td>
<td>Has been a participant once in the past</td>
</tr>
</tbody>
</table>

* Graduated within the past 5 months
* Has been a participant in a usability test in the past
Appendix D. Usability test materials

Figure 1. Email to recruit participants

Hello all,

I am looking for students to participate in a web usability research study. There are two online parts to the study. In the first part you will interact with a website guided by a moderator and in the second part you will interact with a website using an online guide. Both parts are conducted remotely and you would not be required to travel to campus. Each part should take about 1 hour to complete.

To determine if you are eligible to participate, please fill out this Qualification survey which takes about 5 to 10 minutes to complete.


If you are eligible to participate, I will email you more information to get started.
Figure 2. Qualification survey

Survey Title: RIT Web Usability Study - Qualification Survey

Page Title: Demographics

1.) What is your age?
( ) 17 or younger
( ) 18-35
( ) 36-52
( ) 53-70
( ) 71 or older

2.) Which of the following best describes you?
( ) High school student
( ) Undergraduate student
( ) Graduate student
( ) None of the above

Page Title: Activities

3.) How many hours do you spend on the following activities a week? Enter the number of hours you spend on each activity in the "Hours spent" column and type either "online" or "offline" in the "Online or Offline" column.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours spent</th>
<th>Online or Offline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Searching for information / researching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Editing / creating graphics or videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listening to music</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shopping for items / selling items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studying / reading / writing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.) How many times have you used these streaming music websites in the past 1 month?

<table>
<thead>
<tr>
<th>Website</th>
<th>Never</th>
<th>1-10</th>
<th>11-20</th>
<th>21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOL Music</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emusic.com</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Napster</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grooveshark</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last.FM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maestro.fm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mog</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myspace</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pandora</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhapsody</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slacker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yahoo! Music</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.) How many times have you used these browser-based game websites in the past 1 month?

<table>
<thead>
<tr>
<th>Website</th>
<th>Never</th>
<th>1-10</th>
<th>11-20</th>
<th>21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armor Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bing Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candystand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gameforge (MMOGame)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Games.com ( ) ( ) ( ) ( )
Kongregate ( ) ( ) ( ) ( )
Miniclip ( ) ( ) ( ) ( )
Omgpop ( ) ( ) ( ) ( )
Pogo ( ) ( ) ( ) ( )
Popcap ( ) ( ) ( ) ( )
Shockwave ( ) ( ) ( ) ( )
Yahoo! Games ( ) ( ) ( ) ( )

Page Title: Experience

6.) How much experience do you have with human-computer interaction (HCI) and its areas of interest, such as human factors, usability testing, and usability engineering. Check all that apply.

[ ] I work with HCI concepts and practices at my job
[ ] I have conducted one or more usability studies in the past
[ ] I am in an HCI degree program or plan to be in an HCI program within the next 4 years
[ ] I have taken one or more courses on HCI
[ ] I have read about HCI topics on my own
[ ] I have heard about HCI but never used the concepts or studied it
[ ] I have been a participant in one or more usability studies in the past
[ ] None, I have no experience with HCI

Page Title: Your availability and contact information

Enter the times you are available to participate in this research study on the YouCanBook.me website.

7.) Please provide your contact information for the study researcher to contact you. All personal information will be kept confidential and will NOT be shared with anyone outside the study.

Your first name: ____________________________________________
Your email address: ____________________________________________
Your phone number: ____________________________________________
What is your preferred contact method?
( ) Email
( ) Phone
Do you require accommodations (interpreter, etc.)? Please describe.
____________________________________________

Page Title: Thank You!

Thank you for taking this survey to participate in the RIT Website Usability Study. You will be contacted within 3 days by the researcher with more details.
Figure 3. Messages posted to Facebook to recruit participants

Message posted to researcher’s profile on June 11, 2011:
Hi RIT students, want to participate in usability test for my capstone project? To see if you qualify, fill out this survey! – http://edu.surveygizmo.com/s3/555455/qualify2

Message posted to researcher's profile on June 28, 2011:
I'm looking for 12 more people to participate in my web usability research study. If you're a student and would like to participate, fill out this survey -- http://www.tinyurl.com/ritstudy

Message posted to Survey Gizmo's group wall on June 29, 2011:
Hi Everyone, I'm looking for college students to participate in my web research study. Fill out my survey to get started - http://www.tinyurl.com/ritstudy

Figure 4. Message posted to Twitter to recruit participants

Message posted by Survey Gizmo on their Twitter account on June 29, 2011:
Hey, folks - We need a few good college students to help our friend Erika finish her masters! Mind helping her out? http://bit.ly/klgcam
Figure 5. Email sent to participants completing the RS method first

Hi [Insert name here],

Thank you for participating in this RIT web usability study! To get started, please submit a signed consent form. Download the form and then either take a photo of it or scan it in and upload it here.

There are two parts to this study:

Part 1. Moderator guided usability test

You have been scheduled to complete Part 1 on [insert date here] which you indicated on the Qualification Survey. The test moderator will call you at this scheduled date and time to conduct the test and you will use an online guide to help you with the test.

Before talking with the moderator on the scheduled day, please download the free communication tool, Skype, and sign up for an account. You will use Skype to share your computer screen with the moderator during the test.

View the online guide during the test
Username: [enter email here]
Password: The moderator will give you the password at the beginning of the test

Part 2. Self-guided usability test

Please complete this part using an online guide that will walk you through the usability test. This part will take about 1 hour to complete and should be completed within 5 days after finishing Part 1. There is nothing you need to do to prepare.

When you are ready to complete Part 2, visit the online guide and login using the username and password:

View the online guide
Username: [enter email here]
Password: The moderator will give you the password after you complete Part 1.
Hi [Insert name here],
Thank you for participating in this RIT web usability study! To get started, please submit a signed consent form. Download the form and then either take a photo of it or scan it in and upload it here.

There are two parts to this study:

Part 1. Self-guided usability test

Please complete this part using the online guide that will walk you through the usability test. This part will take about 1 hour to complete and should be completed within 5 days after receiving this email and before you complete Part 2. There is nothing you need to do to prepare.

When you are ready to complete Part 1, visit the online guide and login using the username and password:

View the online guide
Username: [enter email here]
Password: async456

Part 2. Moderator guided usability test

Please choose a time when you can participate in Part 2 at this website: http://erika.youcanbook.me. Choose a day that gives you enough time to first complete Part 1. The test moderator will call you at this scheduled date and time to conduct the test for Part 2 and you will use an online guide to help you with the test.

Before talking with the moderator on the scheduled day, please download the free communication tool, Skype, and sign up for an account. You will use Skype to share your computer screen with the moderator during the test.

View the online guide during the test
Username: [enter email here]
Password: The moderator will give you the password at the beginning of the test
The purpose of this research study is to evaluate two websites based on their usefulness, efficiency, effectiveness, learnability, satisfaction, and accessibility. I am NOT testing your abilities in any way; this is strictly a test of the websites. You are in no way obligated to participate. The study is completely voluntary and you can withdraw at any point without penalty from either the researcher or anyone affiliated with Rochester Institute of Technology.

RISKS
There are no physical, mental, or social risks anticipated.

BENEFITS
By identifying any issues with these websites, the web designers will be able to better accommodate user needs and make the web sites more enjoyable.

PARTICIPATION
You have already filled out a qualification survey to determine your eligibility for this study. Personal information from the qualification survey, additional surveys, and recorded communication with the study researcher and session moderator will be kept strictly confidential. There are two sessions to this study which will take approximately 1 hour each to complete. In one session you will perform tasks on a website with the help of a moderator and online guide. In the other session you will perform tasks on a different website with only the help of an online guide. To login to the online guides, you are required to enter your email address and a password supplied by the moderator. Your voice and interaction with the website will be recorded for both sessions and used in the analysis of the websites to discover usability issues. The audio and visual recordings may be used in the final report for this research study and any reference to you or your personal information will not be included.

COMPENSATION
You will receive no compensation for participating in this study.

CONFIDENTIALITY
The information collected in this study will be kept strictly confidential. All personal information will be identified by a unique number for data analysis and reporting purposes. Your personal information will be stored on the researcher's personal computer and will only be visible to the researcher and will not be shared with anyone outside of the study unless you explicitly give written permission to do so. Once the study is complete, all email correspondences and your personal information will be discarded. Any data collected will be returned to you or destroyed if you choose to withdraw from the study at any time.

CONTACT
If you have questions, comments, suggestions, etc. regarding this study, you may contact the primary researcher, Erika Varga, by sending an email to erika@xune.net or calling 908-331-3964. You can also contact a Rochester Institute of Technology faculty member who is advisor to the researcher, Evelyn Rozanski, by sending an email to epr@it.rit.edu or calling 585-475-5384.

CONSENT
Sign your full name below if you agree to the terms of this study.

I have read and understand the above information and I agree to participate in this study.

Participant's signature: ___________________________________________________________________ Date: ___________________
Figure 8. Pre-session survey

Survey title: RIT Website Usability Study - Pre-session survey

Page title: Experience

1.) Have you participated in a usability study in the past?
( ) Yes
( ) No

) How many times have you been a participant in a past usability study?
( ) 1-5
( ) 6-10
( ) 11-15
( ) 16-20
( ) 20+

) Think about the experiences you had as a participant and describe the environment in which the usability studies took place. You can describe individual studies or all of the studies as a whole.
Questions to think about: Was the study in-person or done remotely? Was there a moderator to guide you through the study? What kinds of things did you test (website, physical device, etc.)? How did you provide your feedback and thoughts about the thing you tested?

2.) How many times have you used these web conferencing services in the past month?

<table>
<thead>
<tr>
<th>Service</th>
<th>Never</th>
<th>1-10</th>
<th>11-20</th>
<th>21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Connect</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Microsoft SharedView</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>GoToMeeting</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>IBM LotusLive Meetings</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Webex</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
</tbody>
</table>

3.) Have you used any other web conferencing services, other than the ones listed in the question above? If so, how frequently do you use them?

Page title: Content

) How many times have you used these streaming music websites in the past 1 month?

<table>
<thead>
<tr>
<th>Website</th>
<th>Never</th>
<th>1-10</th>
<th>11-20</th>
<th>21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOL Music</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Emusic.com</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Freec.napster.com</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Grooveshark</td>
<td>(</td>
<td>(</td>
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</tr>
<tr>
<td>Last.FM</td>
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<tr>
<td>Maestro.fm</td>
<td>(</td>
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<td>(</td>
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</tr>
<tr>
<td>Mog</td>
<td>(</td>
<td>(</td>
<td>(</td>
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<tr>
<td>Myspace</td>
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<tr>
<td>Pandora</td>
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<tr>
<td>Rhapsody</td>
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</tr>
<tr>
<td>Slacker</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
<tr>
<td>Yahoo! Music</td>
<td>(</td>
<td>(</td>
<td>(</td>
<td>(</td>
</tr>
</tbody>
</table>

4.) What sources do you use to listen to music?
[] Stream online (on demand)
[] Satellite radio
[] Online radio
[] AM/FM receiver
[] Music stored locally on my computer
[] Digital device (iPod, iPhone, Zune, etc.)
[] CDs, cassette tapes, vinyl
[] Other (Please describe)

) How many times have you used these browser-based game websites in the past 1 month?

<table>
<thead>
<tr>
<th>Website</th>
<th>Never</th>
<th>1-10</th>
<th>11-20</th>
<th>21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armor Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bing Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candystand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gameforge (MMOGame)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games.com</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kongregate</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Miniclip</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Omnpop</td>
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<tr>
<td>Pogo</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Popcap</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Shockwave</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yahoo! Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

) What types of games do you play? This may include PC, console, or traditional board games.
[] Role playing (RPG)
[] First person shooter (FPS)
[] Real time strategy (RTS)
[] Sports
[] Racing
[] Puzzles
[] Board games
[] Other (Please describe)

Page title: Environment

5.) Where are you located during this test session?
   ( ) Home
   ( ) Work
   ( ) School
   ( ) Other

6.) Please describe the location where you are taking this test session. Is it noisy? Are there are other people near you? Can you stay in one location for the duration of this test session?

7.) What type of computer are you using?
   ( ) Desktop
   ( ) Laptop
   ( ) Tablet (ex. tablet mobile phone, iPad)
   ( ) Other

8.) What do you primary use this computer for?
   ( ) School
9.) What size is your computer screen?
( ) 7 to 12 inches
( ) 13 to 18 inches
( ) 19 to 24 inches
( ) 25 or more inches

Page title: Thank You!

Thank you for taking this pre-session survey for the RIT Website Usability Test. Your responses have been successfully saved.
Figure 9. Task difficulty rating survey

Survey title: RIT Website Usability Study

Page title: Rate the task

1.) This task was easy to complete.
   ( ) Strongly agree
   ( ) Agree
   ( ) Neutral
   ( ) Disagree
   ( ) Strongly disagree

Page title: Thank You!

Thank you for your response! It has been successfully saved. Close this window and return to the online test guide.
# Post-session survey

**Page title: Website**

Please answer the following questions about the website prototype you just tested. This is the PDF of the website you viewed when completing the three tasks and is NOT the participant guide you used to find the surveys and guide you through the entire session. Think about anything that was confusing or that did not make sense. All of your thoughts and feedback on the confusing parts will help the designers to develop an easier to use website.

1.) Please select the choice that best reflects how you feel about each statement as it relates to the website you tested.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was easy to find the right information</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
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</tr>
<tr>
<td>The navigation was easy to understand</td>
<td>( )</td>
<td>( )</td>
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</tr>
<tr>
<td>I used the website in the most efficient manner</td>
<td>( )</td>
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</tr>
<tr>
<td>I needed to ask others for help to use the website</td>
<td>( )</td>
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</tr>
<tr>
<td>The website overall was easy to use</td>
<td>( )</td>
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</tr>
<tr>
<td>The language and terms used on the website were confusing and I did not know what they meant</td>
<td>( )</td>
<td>( )</td>
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</tr>
<tr>
<td>The website does not match what I want to do</td>
<td>( )</td>
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</tr>
<tr>
<td>The level of interaction and choices was just right</td>
<td>( )</td>
<td>( )</td>
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</tr>
<tr>
<td>More detail was needed to understand the website</td>
<td>( )</td>
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</tr>
<tr>
<td>I felt comfortable talking about the information on the website</td>
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<td>( )</td>
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</tr>
</tbody>
</table>

2.) Which characteristic of the website was the most confusing and hardest to understand?

( ) Navigation
( ) Layout
( ) Features and concepts
( ) Language and terms used
( ) Level of detail and graphics
( ) Level of interaction / choices that were available to me
( ) Use of images and graphics
( ) Other (please explain)

3.) What did you like most about the website?

4.) What did you like least about the website?

5.) Please describe any other concerns or comments you have about the website.

**Page title: Remote method**

Please answer the following questions about the method you used to take the test, this includes the surveys you took, the software you used, and the participant guide you used. Describe any part of the process that was confusing or that did not make sense.

6.) Please select the choice that best reflects how you feel about each statement as it relates to the remote method you used to conduct the session.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>I received the right amount of guidance from the test moderator</td>
<td>( )</td>
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</tr>
<tr>
<td>It was easy to &quot;think aloud&quot; during the session</td>
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</tr>
</tbody>
</table>
It was convenient for me to complete the session remotely.
It was easy to use the web conferencing software to view the website.
It was easy to record the audio and video for the remote session.
It was easy to download and view the website.
I find it hard to talk to a test moderator without seeing their face.
I provided valuable feedback.
The test session took too long to complete.
It is difficult to figure out what I need to do to complete the entire study (provide the test moderator with the right documents, information, etc.).
The online guide was helpful.
I would participate in a future study using this remote method.

7.) Please rate your level of satisfaction for each part of the session.

<table>
<thead>
<tr>
<th>Thinking aloud</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time needed to complete the entire session</td>
<td>( )</td>
<td>( )</td>
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</tr>
<tr>
<td>Time needed to complete the tasks</td>
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</tr>
<tr>
<td>Interaction with the test moderator</td>
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</tr>
<tr>
<td>Level of guidance from the test moderator</td>
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</tr>
<tr>
<td>Pre-test requirements (survey questions, learning how to use any technology used in the sessions, communication with the moderator)</td>
<td>( )</td>
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</tr>
<tr>
<td>Post-test requirements (survey questions, communication with the moderator)</td>
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</tr>
<tr>
<td>Technology used in the session (online guides, screen sharing software, video/audio recording software, prototype)</td>
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</tr>
</tbody>
</table>

8.) What did you like most about the remote method you used in the session?
9.) What did you like least about the remote method you used in the session?

Page Title: Compare

1.) Which website do you prefer and why?
2.) Which remote method (session) do you prefer and why?
3.) Which session was most convenient and why?
4.) Which session were you most comfortable in and why?

Page title: Thank You!

Thank you for taking this post-session survey for the RIT Website Usability Test. Your responses have been successfully saved.
Appendix E. Music prototype

The following images make up the entire music prototype. Clickable links on each page are indicated by a yellow rectangle.

Figure 1. Home page
The first page the user visits on the website where they can interact with their music and search for music in the community.
Figure 2. A user-created playlist
A “playlist” is a group of songs collected together by the user. Songs can be added, removed, and played from the list.

Figure 3. One song in the song queue
When a song is played or in line to be played, it is added to the “song queue” at the bottom of the page.
**Figure 4. Playing a song in the song queue**
The user clicks the play button on a song in the queue to play it.

**Figure 5. Two songs in the song queue**
Two songs have been added to the song queue and are ready to be played.
Figure 6. Playing a second song in the song queue
Two songs have been added to the song queue and are ready to be played.

Figure 7. Search either music of the community
A message was added to let the user choose their next direction. In the actual website the search field returns results based on the search term. If the user searches for a song that returns results, then those results are shown on the page. If the user searches for a community member's unique User ID, a page indicating no songs were found is displayed, and on the left side of the page, applicable member User IDs are displayed related to the search term.
Figure 8. Music search results
The user searches the community for a particular song by an artist. The search results produce a list of possible matches for the search term “green day”.

Figure 9. Song content menu – Add to new playlist
A context menu is available for each song and gives the user actions related to that song. After conducting a search for a song, the user clicks a song they are looking for and adds it to a newly created playlist.
Figure 10. Song content menu – Add to new playlist
The user uses the song context menu to add a song to a newly created playlist.

![Image of the Music Venue interface with the search bar active and the results for "green day" displayed. The user is selecting a song to add to a new playlist.]

Figure 11. Song content menu – Add to new playlist
The user uses the song context menu to add a song to a newly created playlist.

![Image of the Music Venue interface with the search bar active and the results for "green day" displayed. The user is selecting a song to add to a new playlist.]

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Figure 12. Add song to newly created playlist – Enter details of new playlist
The user enters the details of the new playlist, setting the name and description of the playlist. The user can also specify whether the playlist appears in the left navigation, otherwise the playlist will appear in their list of playlists under “My Music”.

Figure 13. Create a new playlist menu
The user creates a new playlist from a menu at the bottom of the left navigation.
**Figure 14. Create a new playlist menu**
The user creates a new playlist from a menu at the bottom of the left navigation.

**Figure 15. Global community activity stream**
The community activity list is a global look at the community's music and friend activity. When members listen to music or connect with other members, their status is displayed in this list.
Figure 16. Results when searching for a community member
Users can search for other members of the community by using the global search in the top header or by using the search on the “My Community” page.

Figure 17. Community member's profile page
A community member's profile has more information about the person. It displays their music listening habits and connections with other members. Members can “follow” a person which adds that person to a list of people the member is following.
Appendix F. Game prototype

The following images make up the entire game prototype. Clickable links on each page are indicated by a yellow rectangle.

Figure 1. Home page
The home page is the first page the user visits on the website. Featured games are displayed on the left side of the page and friend activity on the right side. The member's game statistics are displayed at the very bottom of the screen.
**Figure 2. Games mega-menu**
The “Games” menu lets the user navigate to all the games on the site.

**Figure 3. Game main page**
Each game has a main page where the member is introduced to the game, can play the game, learn how to play the game, see friend achievements for the game, and see which friends are playing the game.
Figure 4. How to play a game
Each game has instructions on how to play. A game's instructions are available on its main page.

Figure 5. Shops mega menu
The “Shops” mega menu lets the user visit any available game shops. (Not all games have a shop.)
Figure 6. Game shop
A game shop has various items to purchase for in-game play.

Figure 7. Game shop
The can look at each item in the shop to get more details.
Figure 8. Buy an item from a game shop
The user buys an item from a game shop.

Figure 9. Chat menu on the main page
Members can chat with their friends. A friend list is displayed at the bottom right of the screen and shows which friends are have signed into the website.
**Figure 10. Chat with a friend on the main page**
A chat is initiated with a friend and a chat window appears.

**Figure 11. Game queue (waiting to play a game)**
As the queued players wait for additional players, a timer counts down the time until the game starts.
Figure 12. Copy a link to send to others to play the game
A member can copy a link to this game for other members and non-members to play.

Figure 13. Open the friend menu on the game queue page
While waiting to play a game, a member can invite friends to play or chat with friends.
Figure 14. Chat with a friend on the game queue page
A member chats with a friend while waiting to play a game.

Figure 15. Invite a friend to play the current game from the game queue page
While waiting to play a game, a member invites a friend to play. A chat window appears with a game link sent to the friend.