The Effects of Interface Design on Penn State’s Intramural RecSports Website Browsing Experience

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Final Semester Project for IST 331
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Abstract
Our team, Team 3, worked with the Pennsylvania State University’s Recreational Intramural Sports Office’s (PSU RecSports) website. The website contained multiple HCI (human-computer interaction) blemishes that we picked out during our initial evaluation that we later rectified to the best of our ability in our labs. To determine an appropriate font, text size, and color scheme, our team cached and downloaded the website and manipulated the previously stated factors for usability testing. Our participants were given different variations of the original website to collect information on user preferences. We generated heat maps, using green as good, yellow as acceptable but needs work, and red as area of focus, to help assist in visualizing our participants’ feedback. The trials from our participants helped us determine what colors and fonts would best optimize user experience while interacting with the site. Through analyzing our participants, the
studies showed that the site was difficult to use because of long lines of text, small line spacing, small text, and inconsistent use of capitalizations.

To enhance our understand of the Intramural Recreational Sports Office’s (PSU RecSports) website’s usability our team, Team 3, designated three separate tasks for our participants to complete. The tasks assigned consisted of finding three separate hyperlinks containing information pertaining to various sports, eligibility requirements, dates on future events, and scores/records of past sports. After informing our six participants about their tasks they were instructed to begin. We recorded their response times in correlation with the task to establish which aspects generated greater or lesser user satisfaction. We produced heat maps, using green as good, yellow as acceptable but needs work, and red as area of focus, in correspondence with a time trial table to aid in visualization of our participants’ feedback. These color-coordinated time trials helped us determine what sections should be better optimized for user experience. Through testing, we found that none of our participants had previous experience nor were they familiar with the RecSports website. Five out of six participants took the most time to complete task 3 – finding the most recent intramural golf results.
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1. Introduction

When designing web pages there are several factors to consider regarding user experience. User experience is a qualitative measure that determines if the user received satisfaction from the interface or system (ABCS, 2012).

In effective web pages, the designer should aspire to design a page that is not only esthetically pleasing, but also easy to use. As defined in ABCS, hedonics is what brings pleasure to the user, such as color, motion, esthetics, etc. Having an interface be graphically pleasing attracts the user to the site. Our team researched and sought to understand Just Noticeable Differences (JND) in the target user demographic and how that would affect our changes to the Intramural Recreational Sports Website attempting to keep it in line with the color scheme of Pennsylvania State University.

To ensure the interface is usable, the designer should keep in mind the tasks that users will be completing the most on the interface. Task importance increases user experience because it provides the user a sense of accomplishment when the task is complete. By focusing supporting specific tasks more efficiently, the interface can provide a better experience, resulting in user-friendly design (ABCS, 2013). Task analysis enabled our group to study participants to determine if the current RecSports IM Website contained false information scent leading users to the wrong information or wasting time users could be spending on completing the task. This helped our team determine the organization and objective of the site that drives efficiency and a better user experience.
2. Website Objective

The objective of the Penn State Intramural Recreational Sports website is to provide potential university participants and observers with information on play, programs, and fitness-related opportunities. The primary users are active members of the Penn State community, such as students (18 - 24 year-old demographic) and faculty members. Our demographic ranges in age and technical knowledge.

The understanding of the demographic of users and using the results of our analyses helps better user experience because it enables our team to determine which interface layout and organization best supports a majority of the users.

2.1 Point of Access

The primary forms of site access are 13 to 15 inch personal computers, tablet, and mobile devices. A quick survey on April 15th, 2014 of Penn State’s IST 331, Section 002 class, showed that of 44 students, all regularly used and were familiar with personal computers, and only 6 students did not operate, in addition to a personal computer, a smartphone or tablet.

The current website fails to provide formatting friendly to mobile and tablet access.

2.2 Quality of Service

One of the most important aspects of the website is that the user not only be able to access the information they were seeking, but trust that the information they found is correct and up-to-date, false identifications are an issue for a website where logistics are important.

Visual appeal of the site is less important than the quality of function because the site is intended more for practical use than for advertising and attraction. The Intramural Recreational Sports website is accessed to obtain information on registration, rules, sports schedules, sports results,
the variety of sports offered, organization and facility contact, locations, and work related opportunities.

3. Development of Studies

3.1 Points of Interest

From the website objectives, we decided there were several areas we had strong interests in: coloration, fonts, layouts/headers, and purpose/usage.

3.1.1 Coloration

We wanted to determine whether or not there would be a more effective combination of the signature Penn State colors for reading clarity and visual appeal. Color vision deficiency mostly manifests in the inability to distinguish red from green (ABCS 2013), so the Penn State specific colors being blue and white, and blue being the most clear computer color alleviated concern over color selection, but we wanted to clarify the most effective shading and color placement for text clarity.

3.1.2 Fonts

The home page of the Intramural Sports website heavily uses capital letters and uses Arial, Helvetica, Geneva, and Sans Serif in an indiscernible pattern. The overwhelming usage of capital letters minimizes the capacity of the website to utilize the pop-out effect (ABCS 2013), almost eliminating the intention of the full caps headers.

3.1.3 Layout/Headers

We were interested in exploring the accuracy of information access. The full title of the organization is “The Pennsylvania State University Intramural Recreational Sports.” and abbreviates to “Penn State IM RecSports.” Layout and headers became a point of interest when
we realized the organization was often referred to as RecSports or IM Sports, and that they were often used interchangeably. We wanted to know whether or not the website also contained other ambiguities and what role the ambiguity, if any, played in user ability.

3.1.4 Purpose/Usage

We understood the mission of the Intramural Recreational Sports organization, but we wanted to clarify and refine the user mission. What type of browsing users pursued, whether their interest was predominantly leisurely, exploratory, or contained a specific task, specifically the types of information that they sought, and the effectiveness of the site in enabling these tasks.

3.2 Participant Overview

All of our participants were in the 18 - 22 year-old group, the primary age demographic of Penn State undergraduates. We tested each of our subject sets for each type of data on the same day, during the same block of time during the day (before noon, noon to 5:00PM, and 5:00PM to midnight), to prevent influences of potential participant interaction, website alterations, news or campus awareness of Intramural Recreational Sports.

All of our participants were tested in a campus environment, the habitual usage zone of the website, and were tested individually, with at least one team member present, prompting the tasks from a script and observing. Verbal prompting was meant to simulate a more natural task performance than a written fill-in-the-blank, and normalize the presence of a team member so that observations on false positives could be recorded with minimal impact on generating them.

For each analysis, we asked participants for no more than 20 minutes of their time, and asked them for the following general profile of information before beginning:
• Age
• Gender
• Major(s)
• GPA

And in some cases, asked for familiarity with test matter such as font or familiarity with Rec Sports and the website.

3.3 Types of Analysis

When conducting the evaluations for the report, our group had to determine the type of data we were finding - qualitative or quantitative. Qualitative data are statements or general behavior and quantitative data is used verify assumptions by some degree of confidence over the number of users (ABCS, 2013).

Understanding the type of data our team needed to collect and record, helped us determine which analyses our group needed to perform based on the types of variables (dependent vs. independent), face validity, and reliability.

• Independent Variable: a factor that is independent of user behavior and can be varied by the person carrying out the evaluation (ABCS, 2013)

• Dependent Variable: a factor that depends on user behavior or the changes of independent variables (ABCS, 2013)

• Face Validity: also called surface validity refers to whether a test appears to measure a certain criterion
• Reliability: refers to the ability of a measure to produce consistent results when the same things are measured under different conditions

Based on these definitions and their relationship to our report, our group tested for usability by measuring task time and verbal protocols, as well as, conducting patterns of usage and questionnaires/survey evaluations.

Task time is used to measure the efficiency within the fields of HCI and human factors, and ergonomics (ABCS, 2013). During our Task Analysis, task time was used to help us design a better organizational layout of the site. For instance, the original RecSports IM Site had the navigation bar along the left side of the screen where the headers and nodes were often lost within each other because of the font and color choices. Our team provided questions to our participants, which defined the goal of the task allowing us to time how long it took the user to accomplish this.

Verbal protocols are a useful way of understanding the issues that confront users as they try to tackle particular problems using some artifact (ABCS, 2013). Our team collected this data during the Perceptual Lab, where we tested different typefaces and backgrounds. When collecting the data, our team had to ensure we collected “talk aloud” data, meaning the user is reflecting on the task and stores this information in their short term memory (ABCS, 2013). In Perceptual Lab, we used the “talk aloud” data of our participants to create a heat map that outlined the number of negative and positive comments.

When evaluating collecting the data, our team produced mock-ups of the RecSports IM Webpage, which is an example of a Patterns of Usage evaluation, and developed questionnaires/surveys.
• Patterns of Usage Evaluation: place prototype versions of your system in real work settings and observe actual patterns of use, either directly or through video tape (ABCS, 2013)
  
  o Collected “talk aloud” data while the user was interacting with the site in both the Perceptual Lab and Task Analysis
    
    ▪ Allowed us to record the user’s first impressions and document exactly what the errors were and where they were located

• Questionnaires/Surveys Evaluations: subjective measures used to assess attitudes towards a new piece of technology (ABCS, 2013)
  
  o Collected “think aloud” (reflective comments stored in long term memory) data when questioning the user about the performed task and appearance of the interface
    
    ▪ Ensured questionnaires/surveys were bias-free before asking the user questions

The different types of analyses and evaluations previously listed, helped drive the direction of the project in performing the Perceptual Lab and Task Analysis.

4. Analysis of Tasks and Website Paths

The origins of our task analysis stemmed from the ambiguity of the usage of IM and Rec. We wanted to analysis the ability of users to find information from the current site, so we designed a study testing the time to correctly identify a pre-specified piece of information.
As information on college applications, courses and course materials, textbooks, and other extracurriculars trend towards online platforms, it is a necessity that students be able to find relevant and correct information online through a university resource, especially one that is highly sensitive to calendar.

We decided that time was the best measurement of the quality of information scent, as users time on an item or path node based on how well they think that access will help them to find the information they are looking for (ABCS 2013).

4.1 Method Overview

Count of incorrect information identification or path deviation can be subjective in the style of observational and verbal based testing we opted to pursue, so our primary observational unit was time. We decided time was the most concrete observation we could make and that the measure of time, if each iteration was only run once for each participant, would give us some idea as to the quality of paths to information as our participants would have the handicap of inexperience.

4.1.1 Participants

The information we requested from our participants in addition to our standard profile was whether or not they had used the website previous to our testing. This information was crucial to our time outcomes, as we specifically wanted times that were unaffected by the website’s learnability or the participant’s learning curve (ABCS 2013). The information we were interested in was rooted in the quality of information scent.
4.1.2 Apparatus and Materials

For website access, we provided each participant with the usage of a standard 13 inch display MacBook. We cleared the browser history after each iteration to prevent the coloration of previously accessed hyperlinks from impacting our results.

4.1.3 Setting

All testing was done in the vicinity of the Penn State campus to simulate real life usage of the site.

4.1.4 Sample Tools

We selected pieces of information available on the current Intramural Recreational Sports website, that had the same number of steps in their paths to information destination from the home page. The three tasks were:

- Find the Eligibility of Club Sports Participants
  - The information we intended our participants to find can be found at:
    http://www.athletics.psu.edu/recsports/GeneralRules.htm#eligibility

- Find the Date and Time of the Upcoming Intramural Swim Meet
  - The information we intended our participants to find can be found at:
    http://www.athletics.psu.edu/recsports/Flyers/SW.pdf

- Find the Most Recent Results of Intramural Golf
  - The information we intended our participants to find can be found at:
    http://www.athletics.psu.edu/recsports/Results/201314/GFresults2013.pdf
For timing of task completion we used a digital timing stopwatch for precision and reliability, and the task administration was administered verbally, in order to simulate how in a real-time environment the nature of the task would most likely be executed without written declaration.

4.1.5 Procedure

After establishing that our three selected tasks all had a single unique path, testing each path ourselves, we informed our potential participants that the total testing time would take more than 15 minutes, and asked verbally for the following complete profile of information:

- Age
- Gender
- Major(s)
- GPA
- Have you ever previously used the Penn State Intramural Recreational Sports website? (Yes or No)

Once we determined that each participant did not, in fact, have previous experience with the website, we placed a standard 13 inch MacBook, either a Pro or an Air, with the Penn State Intramural Website homepage opened on a Firefox browser. We then asked the participants to find three pieces of information, using the exact rhetoric and order of each piece as stated in the Sample Tools, and to verbally acknowledge when they thought the information had been accessed. The participants were not informed that each task had a single path.
Each trial was observed by a group member, who determined the correctness of each task completeness and time of completion, and reset the browser to the Intramural Website homepage, clearing the history so evidence the prior task in the browser was minimized. All trials were completed correctly.

4.2 Subject Analysis

As illustrated in Table 2a, three of our six participants experienced a 0% deviation in their rankings of task completion times from fastest to slowest. Of our remaining three participants, two experienced participants had two of the same time rankings, deviating only in one ranking. The third participant, the only one with three distinct rankings had relatively small variations from personal task completion times. From the participant’s fastest completion time to slowest completion time, there was a variation of 24.51%, as opposed to the average 39.73%. From the participant’s second task completion time to slowest completion time, there was a variation of 4.28% against the average 19.00%.

From this, we concluded that our results were consistent enough to draw conclusions in relative task completion times of each task.
### Table 1: General Participant Information

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Sex</th>
<th>Age</th>
<th>Major</th>
<th>GPA</th>
<th>Used Website Before?</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Male</td>
<td>20</td>
<td>Electrical Engineering</td>
<td>2.98</td>
<td>No</td>
</tr>
<tr>
<td>P2</td>
<td>Male</td>
<td>21</td>
<td>Civil Engineering</td>
<td>3.60</td>
<td>No</td>
</tr>
<tr>
<td>P3</td>
<td>Male</td>
<td>21</td>
<td>Film</td>
<td>2.70</td>
<td>No</td>
</tr>
<tr>
<td>P4</td>
<td>Male</td>
<td>21</td>
<td>IST</td>
<td>4.00</td>
<td>No</td>
</tr>
<tr>
<td>P5</td>
<td>Female</td>
<td>20</td>
<td>Graphic Design</td>
<td>3.57</td>
<td>No</td>
</tr>
<tr>
<td>P6</td>
<td>Female</td>
<td>22</td>
<td>Biochemistry</td>
<td>3.22</td>
<td>No</td>
</tr>
</tbody>
</table>

### Table 2a: Participant Task Results in Seconds

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Task #1: Find “Eligibility of club sports participants.”</th>
<th>Task #2: Find “The date of the IM swim meet.”</th>
<th>Task #3: Find “The most recent golf intramural results.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>25.7</td>
<td>19.4</td>
<td>24.6</td>
</tr>
<tr>
<td>P2</td>
<td>32.4</td>
<td>27.8</td>
<td>35.2</td>
</tr>
<tr>
<td>P3</td>
<td>37.3</td>
<td>29.3</td>
<td>39.1</td>
</tr>
<tr>
<td>P4</td>
<td>26.0</td>
<td>16.4</td>
<td>29.3</td>
</tr>
<tr>
<td>P5</td>
<td>8.3</td>
<td>14.8</td>
<td>29.4</td>
</tr>
<tr>
<td>P6</td>
<td>12.2</td>
<td>16.2</td>
<td>25.4</td>
</tr>
</tbody>
</table>

### Table 2b: Participant Task Results Color Key

<table>
<thead>
<tr>
<th>Faster Time</th>
<th>Slower Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Red</td>
</tr>
</tbody>
</table>
4.3 Data Analysis

As illustrated in *Table 3a*, Task 3 overwhelmingly took the most time to complete. For none of our participants, was Task 3 the fastest complete. The only participant for where Task 3 was not the slowest task of completion deviated only from the second slowest task by 6.14% of the slowest completion time. For the other five participants, Task 3 was the slowest task by an average of 22.25% of their slowest completion time to their second slowest. From this, we concluded the path of Task 3, was distinctly more difficult than the other tasks.

*Table 3a: Participant Task Results as Percentage of Respective Participant Total Time*

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Task #1: Find “Eligibility of club sports participants.”</th>
<th>Task #2: Find “The date of the IM swim meet.”</th>
<th>Task #3: Find “The most recent golf intramural results.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>37%</td>
<td>28%</td>
<td>35%</td>
</tr>
<tr>
<td>P2</td>
<td>34%</td>
<td>29%</td>
<td>37%</td>
</tr>
<tr>
<td>P3</td>
<td>35%</td>
<td>28%</td>
<td>37%</td>
</tr>
<tr>
<td>P4</td>
<td>36%</td>
<td>23%</td>
<td>41%</td>
</tr>
<tr>
<td>P5</td>
<td>16%</td>
<td>28%</td>
<td>56%</td>
</tr>
<tr>
<td>P6</td>
<td>23%</td>
<td>30%</td>
<td>47%</td>
</tr>
</tbody>
</table>

*Table 3b: Participant Task Results as Percentage Color Key*

<table>
<thead>
<tr>
<th>Lower Percentage</th>
<th>Greater Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
4.4 Usability Conclusions

Task 3, the finding of the most recent intramural golf results, was decidedly the most “difficult” task. Each task, took two clicks to complete, and despite Task 2 requiring more length of scrolling than Task 3, it was still on average, 32.3% faster. The greatest difference between these three tasks was the texts headers in each of the paths.

Efficiency is a major aspect of a site’s usability. The goal for usability is to have the maximum level of learnability and easiness of use. Information scent is a vital tool used with websites to help users find what they are seeking with minimal effort. With the majority of the participants incapable of navigating through the site with quickness and ease, it is clear that the site mapping could be reworked. To be more specific, the navigation of sports and sports related information needs to be reorganized.

With more distinct headings, categories, and less text on the main page, better usability could be accomplished. Users had issues getting to their destination when they were unsure about which links to click and when they could not find the appropriate links quick enough.

4.5 Lessons Learned for Future Exploration

One of the issues we struggled with, as a group, was the ordering of tasks. Because we were specifically interested in finding participants without previous experience with the website to avoid experience bias in our test results, we were concerned that in asking each of our participants for three task executions, that for the second and third tasks, completion times would be affected and skewed by prior ones. To minimize this, we selected task paths that were entirely independent of each other so that no task would give our participants relevant knowledge of the exact path for future tasks, and informed our users of the tasks one at a time. Our participant pool
was too small to reliably draw conclusions about knowledge influence from varying the order of
the tasks but to further reduce the risk of knowledge if this lab would be repeated, we would be
interested in executing a study with the scale of 100+ participants.

With the larger scale study, we would run have of the participant trials in the order that we ran
this study, and divide the rest of the participants evenly among each variation of the three task
orderings. This would give us a better indication of knowledge generated from the lab and its
implications on residual task completions.

Another issue we struggled with was the definition of time completion. We debated between
using a tracking software and digital stopwatch for determining the times of task completion. We
decided that for the purposes of this study, it was more important for us to know when the users
felt that they had accessed the task information, than the actual, physical opening of the page. If
we were to repeat this lab on a larger scale we would record both times to get a better
understanding of how users interacted with information once physically accessing a page, and
the discrepancy between the two times.

An avenue our group would also be interested in exploring would be A/B testing. Because none
of our participants falsely completed a task, in a larger data sample, we would like to know
whether points of information were more quickly accessed via different paths with the same
number of clicks to access. This would give us greater insight into the quality of the paths of
each piece of information. The Penn State Intramural Sports website is a text-heavy site with
minimal graphics, and A/B testing with a graphic-inclusive path versus the pure text ones we
tested, would be helpful information for the final design of our site.

We also would have liked to explore the number of steps in a path of information access. With
testing only three information points, we had limited ability to understand the different impacts
the quality of the keywords and the number of steps. We tried to accommodate that in our study by electing to measure only the times of paths with the same number of steps, but by varying the number of steps among a larger participant population with greater testing variation, we could better understand the implications of these two factors on our website.

The final variable we struggled with to grasp in our data analysis was gender. Because our study was restricted to six individuals, two of whom were female, and four of whom were male, we were hesitant to draw conclusions from gender, even though the behaviors of our female participants appeared strikingly similar.

5. Perception and Interaction of Users in Stylization Analysis

To determine an appropriate font, text size, and color scheme, our team downloaded the site and manipulated the size and color of the font, the typeface, and the background color. After describing the assignment to our participants, we recorded their responses and critiques of the sites to determine which aspects generated greater user satisfaction. We generated heat maps to help us visualize the participant feedback, and these trials helped us determine what colors and fonts would best optimize user experience.

In order to analyze user interaction and perceptions, we decided to invite participants to give feedback on their ability to read the same text, over a variation of colors and text fonts. We took The Pennsylvania State University Intramural Sports website, a site we plan on working on, and altered the home page body text and color blocking for each iteration of texting.

For font analysis we chose Calibri, Arial, and Times as fonts. These were basic, familiar fonts with a variation of serif, and sans serif fonts. For colors, we chose variations of heavily used Penn State colors, blues, grays, and whites. Because we plan on using this data for later website
development, we wanted to maintain the spirit of the site, and receive feedback on potential colors we could use.

Times, one of the most widely used typefaces in history, was chosen as our control for the study because of its high recognizability and wide usage in Microsoft products. Our participants are Penn State students, who have high rates of familiarity with Times. We ran four iterations of font feedback tests, one in Times with all style removed, one in Times with bolding in headings, one with Calibri with bolding in headings, and one with Arial, also with bolding in headings.

We ran five iterations for color analysis. We wanted to vary the scales of the body and background colors. The sidebar with hyperlinks was drawn into the background in the original site.

5.1 Method Analysis

In testing we wanted to understand not only how well the participant felt they could read the text, but how they perceived each variation of the sample. Verbal feedback and participant observations were crucial in our understanding of how the user felt about and enjoyed variations and aspects of the website.

5.1.1 Participants

In addition to the general profile of participant we asked each of our participants for information on the fonts we were interested exploring were Arial, Calibri, and Times.

As with the task analysis of the website, we invited participants that had no prior experience with the Penn State IM Rec Sports website to give us feedback. We were interested specifically in initial impressions, as one of the goals of the website is to attract new intramural activity and is a point of interest for potential students.
5.1.2 **Apparatus and Materials**

For the displaying of each iteration of our samples, we used standard Apple MacBook 13 inch screens, either a MacBook Pro or MacBook Air. Each iteration we opened for the participants prior to testing, and each iteration was opened in either Google Chrome or Mozilla Firefox.

5.1.3 **Setting**

All testing was done on the Penn State campus vicinity, to simulate standard usage environments.

5.1.4 **Sample Tools**

The tools used for development were aides in manipulating and altering the original version of the Penn State Intramural Recreational Sports website.

- **BlueGriffon**
  - BlueGriffon is an HTML editor powered by Gecko. It was used to do the manipulations of website iterations.

- **Adobe Dreamweaver**
  - Adobe Dreamweaver allows users to share work from directly within the application.

- **FireFTP**
  - FireFTP was utilized along side Firefox to cache directories.
5.1.5 Procedure

The final profile we approached our participants for was:

- Age
- Gender
- Major(s)
- GPA
- Have you ever previously used the Penn State Intramural Recreational Sports website? (Yes or No)
- Are you familiar at all with the font Arial? (Descriptive Response)
- Are you familiar at all with the font Calibri? (Descriptive Response)
- Are you familiar at all with the font Times? (Descriptive Response)

All of our participants were familiar with the fonts Arial, Calibri, and Times, and had negligible understanding of fonts and colors so we omitted those variables from further analysis. None of our participants had previously used the IM RecSports website, so we omitted usage biases from our field of concern. We defined negligible understanding as having no experience with selection of fonts or colors beyond personal preference.

We opened each variation of our website layout in a Google Chrome or Firefox tab, and placed the laptop in front of each participant at what they defined as standard laptop usage distance from themselves for optimal computer usage (ABCS, 2013).

We asked each participant to look at each tab, one at a time, and commentate each sample. We recorded all feedback and used key terms as qualifiers in our data analysis.
In data analysis of fonts we observed participant input specifically in their perception of text size, text density, and ease of reading, and made note of their overall impression. In the data analysis of colors we observed participant input on ease of reading, and their overall impression.

5.2 Subject Analysis

As evident in Table 4, all of our participants fit our standard profile, but our limited range of participants prevented us from drawing any conclusive statements on the correlation of GPA, major, gender, or age with the task completion times of individuals on the Penn State IM Rec Sports website.

Table 4: General Participant Information

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Sex</th>
<th>Age</th>
<th>Major</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Male</td>
<td>20</td>
<td>Aerospace Engineering</td>
<td>3.50</td>
</tr>
<tr>
<td>P2</td>
<td>Male</td>
<td>21</td>
<td>Economics</td>
<td>3.00</td>
</tr>
<tr>
<td>P3</td>
<td>Male</td>
<td>20</td>
<td>Aerospace Engineering</td>
<td>3.80</td>
</tr>
<tr>
<td>P4</td>
<td>Female</td>
<td>20</td>
<td>Industrial Engineering</td>
<td>3.20</td>
</tr>
</tbody>
</table>

For data visualization purposes we developed a heat map of user response to our various font configurations. We mapped all the participant results on the same map for each specific test scenario to examine net response.
We mapped four versions of font combinations, the original site font selections, without all the headers without capitals and without bolding, Table 6; the original site font selections with all the headers without capitals but in bold, Table 7; the site layout done with the text in Arial, without all the headers in capitals but with bold Table 8; and the site layout done with the text in Calibri, without all the headers in capitals but with bold, Table 9.

From the mapping of the fonts and their styles, we could see from Table 9, that the not capitalized, bold, Calibri font combination had overwhelmingly the most negative feedback, and from Table 8, the not capitalized, bold, Arial font combination had overwhelmingly the most positive feedback.

The original website font text modifications were both relatively neutral, in relation to the Arial and Calibri, indicating that our participants had a strong preference for the usage of Arial over Calibri, and Arial over the current font scheme.

Table 6: Assessment of Website “NotCapital” Font Style

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Text Size</th>
<th>Text Density</th>
<th>Ease of Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Average</td>
<td>Average</td>
<td>Good</td>
</tr>
<tr>
<td>P2</td>
<td>Average</td>
<td>Average</td>
<td>Average</td>
</tr>
<tr>
<td>P3</td>
<td>Bad</td>
<td>Bad</td>
<td>Bad</td>
</tr>
<tr>
<td>P4</td>
<td>Bad</td>
<td>Average</td>
<td>Good</td>
</tr>
</tbody>
</table>
### Table 7: Assessment of Website “NotCapital, Bold” Font Style

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Text Size</th>
<th>Text Density</th>
<th>Ease of Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Average</td>
<td>Below Average</td>
<td>Average</td>
</tr>
<tr>
<td>P2</td>
<td>Good</td>
<td>Average</td>
<td>Average</td>
</tr>
<tr>
<td>P3</td>
<td>Average</td>
<td>Bad</td>
<td>Below Average</td>
</tr>
<tr>
<td>P4</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>

### Table 8: Assessment of Website “NotCapital, Bold, Arial” Font Style

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Text Size</th>
<th>Text Density</th>
<th>Ease of Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Below Average</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>P2</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>P3</td>
<td>Good</td>
<td>Good</td>
<td>Bad</td>
</tr>
<tr>
<td>P4</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>

### Table 9: Assessment of Website “NotCapital, Bold, Calibri” Font Style

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Text Size</th>
<th>Text Density</th>
<th>Ease of Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Bad</td>
<td>Bad</td>
<td>Bad</td>
</tr>
<tr>
<td>P2</td>
<td>Good</td>
<td>Bad</td>
<td>Good</td>
</tr>
<tr>
<td>P3</td>
<td>Bad</td>
<td>Bad</td>
<td>Bad</td>
</tr>
<tr>
<td>P4</td>
<td>Bad</td>
<td>Bad</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For the analysis of participant color preference, we maintained the same scale from Table 5, to analyze the positivity of various color schemes. The Pennsylvania State University colors consist of a pallet of blue, white, and standard working colors, such as black and gray. We used a configuration of these color styles to gauge the impact in site legibility and visual appeal.
The five styles we observed in Table 10, consisted of light blue, blue, dark blue, gray, and white. Overwhelmingly light blue and blue, were participant favorites. The dark blue made the ability of participants to read the website headers extremely difficult, and the gray and white did little for utilizing the pop-out effect and for communication of school pride and Penn State distinction.

**Table 10: Assessment of Website Color Styles**

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>LightBlue</th>
<th>Blue</th>
<th>DarkBlue</th>
<th>Gray</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Good</td>
<td>Good</td>
<td>Bad</td>
<td>Below Average</td>
<td>Good</td>
</tr>
<tr>
<td>P2</td>
<td>Good</td>
<td>Good</td>
<td>Bad</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>P3</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Bad</td>
<td>Bad</td>
</tr>
<tr>
<td>P4</td>
<td>Below Average</td>
<td>Good</td>
<td>Bad</td>
<td>Bad</td>
<td>Bad</td>
</tr>
</tbody>
</table>

5.3 Data Analysis

Analyzing the participant feedback in the heat mapped figures; our team was able to draw several clear conclusions from the data. Working one-on-one with participants in our data collection gave us the benefit that “talking-aloud data is more valid because it is less likely to be contaminated” (RBS, 2013).

Our participant verbal feedback was largely in line with ‘Factors that Make Reading Difficult’ as described by *Foundations for Designing User-Centered Systems* (ABCS, 2013). All of our participants remarked upon the long text line length, small font sizing, narrow line spacing, and inconsistent use of fully capitalized words.

Color vision deficiency lies in the primary colors of computer interfaces: red, green, and blue.

The Penn State IM RecSports website is fortunate in color scheming in that the majority of color
vision deficiency occurs in the ability of users to tell the difference between red and green, and the website primarily works in the most distinguishable of shades.

The colors used in the site played a strong role in user favorability of the site, as evident in Table 10. Our participants overwhelmingly favored background and text colors in line with general color system theory (ABCS, 2013). Utilizing color, rather than dispersing it conveniently, helps to separate and distinguish information.

5.4 Usability Conclusions

Four undergraduate students attending Pennsylvania State University served as our participants in this lab. We observed each participant recording his or her statement about each page presented to them.

By collecting verbalized thoughts, the input we received was broad in interest, although concise in attitude, and left for us to best interpret to utilize. This helps our team make comparisons to other studies that document what affects user’s ability to read and process information, such as several studies noted in Foundations for Designing User-Centered Systems. The heat maps of Table 6 - Table 10 helped us depict which aspects of a website are more important to users and how the relationships between those aspects affect user experience.

We concluded that there were more effective font selections, such as Arial, than the current website font usage, and a more legible combination of light blue and blue that could lead to a more satisfactory user experience.

5.5 Lessons Learned for Future Exploration

User perception is entirely subjective. Expression, tone, and quality of feedback is all essential to understanding how our participants felt about each derivation of the website beyond the
keywords they said. We specifically avoided asking our participants use a Likert, 5-point, or semantic scale to analysis our areas of interest because we were concerned about the role that personal preference would play. Because our participants are also our target demographic for the website, we also we didn't want to guide our participants impressions, and we wanted to make note of what was self-reported. Where this became an issue for us, however, was in determining a method of data analysis. Only one group member was present for each test, and the understanding of expression, tone, and feedback quality was limited to that group number. Categorizing our data for anyone other than that present group member was virtually impossible, and interpretation was exclusive to that member.

If this test was repeated, we would be interested in recording each of the participants during trial, to narrow the space for interpretation and increase the accuracy of records. We would also be interested in running a second part to our trial.

In the second part of our trial, after our initial procedure, we would administer a survey scale for each of our points of interest. We would use the same heat color scale in the data analysis of the scale as used in our current feedback, and investigate the positivity and negativity correlation of verbal feedback and the individual's scale.

The colors we explored were all in the palette of Penn State colors: blue, grey, black, and white. Blue, the central color of the website, is used to convey strength, security, cleanliness, and focus. Tinkering and varying the central color of the iterations to understand the role that blue played in our participant feedback would be another interest of ours in a continued study.
6. Conclusions and Summary of Suggestions

The tasks designed to test the usability of the Pennsylvania State University’s Recreational Intramural Sports Office’s website displayed the need to improve the HCI. We have concluded the components at need include the colorization, fonts, layouts and headings, and site purpose. Through the manipulation and reproduction of the website, we were able to collect data on the users’ problems and preferences. Our team used multiple font selections, text sizes, color schemes, and formatting in the reproduced websites to provide solutions to increase the usability and user experience. Based on these changes, the following section highlights some suggestions our team would recommend to enhance the RecSports IM site.

6.1 Client Feedback

When meeting with the client, our team learned several pieces of information. After the meeting with the client our team learned:

- The web designer position for the RecSports IM site is voluntary and unpaid
- The site contains HTML code, that could be almost 15 years old
- The entire Penn State RecSports department are voting on new software over the summer

At the start of the meeting our team received this information, which set the tone of the meeting. According to our client, the entire RecSports department will be installing a new software system that will incorporate all digital aspects within the building, sporting events, and communication. This will include the website’s format, design, and input process. The client was kind enough to still hear our suggestions because they may be able to implement these points in the creation of their new website.
6.2 Changes in Font

For the Perceptual Lab our team created several prototypes of the RecSports IM site, to assess user preference. One of the tests included changes in the font. On the current page, several different fonts are used, but none of the fonts help the user differentiate the importance of the information. In our prototypes we changed the font, the style, and color, which helped our team determine fonts that are user friendly and how to differentiate information incorporating pop-out effects.

6.2.1 Main Font for Website

Studying the results of our participants and conducting outside research, our team determined that sans serif fonts are more appealing to the user boosting user experience. The font seems to be easy on the eye making it easier to read the information on the site.

6.2.2 Differentiating Information

According to the participants in the study, they could not differentiate important information compared to detail information about the site. Incorporating pop-out effects will help users find information and determine whether it is important or not. Some pop-out effects include:

- Making the style of the important information different style from that of the body text by italicizing, bolding, or underlining the text
- Changing the color of the important information to a different color from that of the body text
  - Need to make sure the color is noticeably different from that of the body text
  - Need to make sure the contrasting color is still readable against the background
• Highlighting the text a noticeable color that stands out against the background

Including pop-out effects helps the designer of the site ensure that the information they wish to communicate is being communicated to the users of the site.

6.2.3 Number of Different Fonts

As stated above, the current site currently uses multiple fonts that do not help organize the RecSports’ site’s information. According to Foundations for Designing User-Centered Systems, any document or site should use at most two different fonts; one for headings and one for the text of body paragraphs. This helps layout organization by breaking up body paragraphs into information blocks making the site more readable.

6.3 Format of Website

For the Task Analysis Lab our team timed participants’ ability to find information pertaining to a certain sport. They would follow hyperlinks they believed would lead them to the final destination. The tool used to maximize the efficiency of a user to navigate a site is called information scent. If the site was redesigned to increase its easiness of use and level of learnability, users would have better experience.

6.3.1 Navigation

The current site uses a long list of hyperlinks on the left side of the page. As noted in studies, users found this hard to visually search for the keywords they desired. The organization lacked distinction to direct focus to necessary topics. Headers should be main focus of with subheaders linked accordingly. Drop-down menus can be incorporated to allow users to view options in a related set of links.
6.3.2 Sorting of Information

When searching for desired information, users make assumptions to where this information will be located. This should be taken into account when creating headers, sections, and pages. In our task analysis lab, users had trouble finding information on a particular sport because it was sorted by semester. A more effective method would be to have separate pages for sports or allocation a preview function to links.
Acknowledgments

We would like to express our appreciation to all of those who participated in this lab, giving us the resources to complete this report.

A special acknowledgement to the Pennsylvania State University Intramural Recreational Sports for the website from which we developed our purpose and studies. We thank them for their time in feedback, information, and openness to our suggestions and data analysis.

Furthermore we would like to recognize and thank all of our participants who engaged in this lab. We realize the time commitment, effort, and energy that it took to enable us to have data to analyze. We have the utmost gratitude for all of the effervescent spirit despite the meticulousness of the task.

Last, but not least, many thanks to Frank Ritter, Changkun Zhao, the developers of the IST 331 course, the Pennsylvania State University, and our peers; whom without we wouldn't have undertaken this lab, who have guided our thought process and for the critiques they provide us.

Thank You,

Team 3
References


Appendix A. Website Title Key

<table>
<thead>
<tr>
<th>Site Title</th>
<th>Site URL</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NotCapital</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/RecSiteNotCapital.html</td>
<td>Caps locks were removed from site headings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>San Serif font</td>
</tr>
<tr>
<td>NotCapital</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/RecSiteNotCapitalBold.html</td>
<td>Caps locks were removed from site headings</td>
</tr>
<tr>
<td>Bold</td>
<td></td>
<td>Headings’ text bolded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>San Serif font</td>
</tr>
<tr>
<td>NotCapital</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/RecSiteNotCapitalBoldArial.html</td>
<td>Caps locks were removed from site headings</td>
</tr>
<tr>
<td>Bold Arial</td>
<td></td>
<td>Headings’ text bolded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arial font</td>
</tr>
<tr>
<td>NotCapital</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/RecSiteNotCapitalBoldCalibri.html</td>
<td>Caps locks were removed from site headings</td>
</tr>
<tr>
<td>Bold Calibri</td>
<td></td>
<td>Headings’ text bolded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calibri font</td>
</tr>
<tr>
<td>White</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/recsportswhite.html</td>
<td>Background color changed to white</td>
</tr>
<tr>
<td>Gray</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/recsportsgray.html</td>
<td>Background color changed to gray</td>
</tr>
<tr>
<td>LightBlue</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/RecSiteLightblue.html</td>
<td>Background color changed to light blue</td>
</tr>
<tr>
<td>Blue</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/recsportsblue.html</td>
<td>Background color changed to blue</td>
</tr>
<tr>
<td>DarkBlue</td>
<td><a href="http://www.personal.psu.edu/smm60">http://www.personal.psu.edu/smm60</a> 19/recsportsdarkblue.html</td>
<td>Background color changed to dark blue</td>
</tr>
</tbody>
</table>
Appendix B. Original Website
Appendix C. Updated Website

Home of PSU Intramural Sports
If you watch a game, it's fun. If you play, it's Recreation!

Welcome!

Looking for cancellations due to weather?
They will be posted to our Facebook page after 4pm!

Home of PSU Intramural Sports
If you watch a game, it's fun. If you play, it's Recreation!

Fall Intramural Sports

<table>
<thead>
<tr>
<th>Sports</th>
<th>Register</th>
<th>Fee</th>
<th>Division</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softball</td>
<td>Aug. 26-29</td>
<td>$65</td>
<td>Open &amp; Freesby</td>
<td>Choose: Mon/Wed or Tue/Thurs</td>
</tr>
<tr>
<td></td>
<td>max 128 teams</td>
<td>per team</td>
<td></td>
<td>Choose: 6, 7, 8pm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Starts Sept. 9, Bats provided</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-Week league + playoffs</td>
</tr>
<tr>
<td>Soccer</td>
<td>Aug. 26-29</td>
<td>$65</td>
<td>Co-Rec</td>
<td>Choose: Mon/Wed or Tue/Thurs</td>
</tr>
<tr>
<td>Co-Rac</td>
<td>max 108 teams</td>
<td>per team</td>
<td></td>
<td>Choose: 6, 7, 8pm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Starts Sept. 9, Bats provided</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-Week league + playoffs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 women &amp; 3 men on the field</td>
</tr>
</tbody>
</table>