THE PENNSYLVANIA STATE UNIVERSITY
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DIVISION OF SCIENCE AND ENGINEERING

STUDY OF Penn State Webmail USABILITY AND DESIGN EFFECTIVENESS

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ABSTRACT

With more of the nation's, and world's, population gaining knowledge about the Internet, it is becoming that much more important for businesses to be able to reach out to potential customers over this medium. However, with something so new, people want an online experience as hassle-free as possible. Otherwise, businesses run the risk of losing their online customer base, and will be unable to adapt to any future trends in online sales.

The purpose of this experiment is to prove whether or not this is true – if people will get "turned off" of a website that is difficult to use. This will be done through a web-based, IRB-approved survey, filled out by IST majors at the Pennsylvania State University Abington campus. The subject of this survey is Penn State Webmail, a free browser-based e-mail client available to students of the Pennsylvania State University.

During the survey, students will be asked about their experiences in doing three common tasks on the site: writing and sending e-mail messages, searching for and managing contacts, and creating and managing message folders. The survey also includes a section on comparing the ease of these tasks with doing them on any other webmail clients the students may use, and another on general web page usability questions.

The data collected from this survey shows the importance of making all sorts of tasks, not just reading text, on websites easy to accomplish. Some actions common to Penn State Webmail were easy to do based on their own merits, but were harder to do when compared to the same tasks on other webmail sites. As such, even though general qualities of websites tested positively, not all students would prefer to continue using Penn State Webmail if given the chance. Businesses that are developing their own websites must test all actions that can be performed on them in order to avoid a similar fate.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

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I would also like to thank Gholam Khaksari, Assistant Professor of Information Science and Technology. I was inspired to select him as my second reader because of a class he taught me in human-computer interaction. The work I did for a project in that course helped inspire my passion in web design, which shows in this thesis. I would also like to thank Dr. Andrew August, Professor of History, who has served as my advisor in the Abington Honors Society and Schreyer Honors College. He has helped me make sense of all the requirements I need in order to graduate with honors, from course selection to this thesis. Without his information and guidance, I would not be in a position to write and publish my work.

Chapter 1

What Makes Good Website Design?

Before going into the details of the experiment, we must first understand what makes a web site easy or difficult to use. One definition of website accessibility states that "anyone using any kind of web browsing technology must be able to visit any site and get a full and complete understanding of the information as well as have the full and complete ability to interact with the site if that is necessary" (Letorneau, 2001). In other words, the web pages should not inhibit people's ability to access data or perform other actions on them. By knowing the good or bad qualities of web pages, not only will the details of the experiment be easier to follow, but this knowledge can be applied to sites beyond the experiment and be used to create experience in making new websites.

Page Layout

One of the most important contributing factors for a website is the consistency across all its pages. When applied to websites, consistency means that all the pages in a site have the same, or similar, look and layout. When everything is placed as it is on other pages in a site, the user will know where to look, and navigation becomes easier. The user may also be influenced by his or her experiences on other sites, however, so even if he or she visits a particular site for the first time, he or she may look for certain things in a certain portion of the page. Page design also ties into the concept of memory. The more steps that people have to remember, the more likely it is that they will make a mistake or forget one of the steps completely (Schneiderman, 2005, p.62).

By having navigation components in the same place on multiple pages, users will not have to remember as many different places to click, thus reducing the probability of error.

One of the most popular layouts for web pages can be broken down into three main areas (Preece, 2002, p.273):

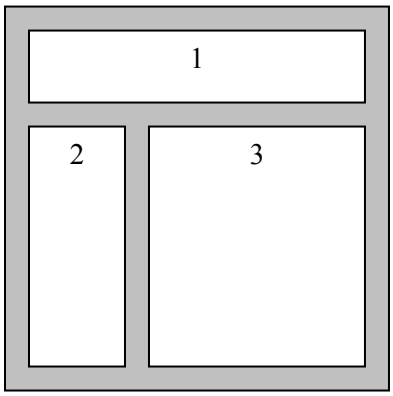

Figure 1-1: The basic layout of most web pages.
Key: 1) Header.
2) Navigation.
3) Content.

In Figure 1-1, the top region, labeled 1, is the page header. The header is commonly used for branding the pages, and may contain the title of the site and/or page. Navigation links may also be found here. It is also a common practice, however to have the navigation links on the left side of pages. The remaining section in the center of the page houses the main content, which differs from page to page.

One particular fad in web page design, frames, was used as a page layout tool for quite some time. Framing is a method of displaying two or more HTML documents in the same browser window. For example, the navigation panel (section 2 in Figure 1-1) could be its own frame panel, set aside from the rest of the document. Separate frame panels have their own scrollbars, allowing them to be scrolled up or down independently from the other panel or panels. Some examples of frames even allow the panels to be resized.

While frames may sound like a boon, especially for users who like to multitask, they have come across controversy ever since Netscape first proposed it for use in the HTML standard. The main criticism regarding frames is their inconsistent interaction with the browser's Back and Forward buttons. If coded improperly, using the Back or Forward buttons could affect a panel

other than what the user expects. It would be frustrating if, for example, the navigation frame moved back or forward instead of the main content panel. Furthermore, frames are not universally supported by all browsers. Mosaic, the browser that first popularized the World Wide Web in the early 1990s, did not support frames. In 2009, frames were dropped from the HTML 5 standard as "their usage affected usability and accessibility for the end user in a negative way" (W3C, 2009).

Navigation and Links

The very structure of a website must also facilitate the user's experiences while browsing it. The more pages the user must go through to get to a particular location, the more likely he or she is to make a mistake on the way there and end up on an unwanted page. Given the importance of facilitating memory, a logical choice would be to list all the navigation options in one giant menu. However, this is unwise because the user would have increased difficulty finding and remembering where to find a specific link.

Another important tip to improve ease of navigation is to always have all the links visible. Some websites hide links or other content until the user hovers the mouse pointer over a certain text or area. Furthermore, if the pointer strays from that area, those links will disappear until the process is repeated. This "mystery meat navigation", as some sites call it, can be a source of great frustration (Flanders, 1996). The website for the Management Center of Innsbruck, pictured below in Figure 1-2, is a particularly bad example of bad navigation. Not only do links appear and disappear in the manner described above, but the text is small and there is no real content on the home page. Since none of these links overlap each other on the page, it is unnecessary for them to disappear like this in the first place.

Figure 1-2: The website for the Management Center of Innsbruck <www.mci.edu/com/index.html> exhibits poor navigation techniques.

Links, which will take the user to another page when clicked on, must be easy to find and should describe their destinations in just the right amount of detail (Shneiderman, 2005, p.62). Embedded links are links that are surrounded on one or both sides by non-link text. Generally, embedded links are undesirable since some readers might not be able to distinguish them from the rest of the text they are reading. A study by Jared M. Spool (1999) found "a strong negative correlation between embedded links […] and user success in finding information". It is also advisable to avoid having one link wrap around into multiple lines of text, which may occur with a narrow column of text. Users may confuse one link for two or three, for instance.

Colors

The color scheme used in a web page can be instrumental in creating a theme for a web site. For example, a color scheme can match that of a company's logo, thus further identifying it with that brand. Consistency also comes into play here, since using a similar or identical color

scheme across all a site's pages will prevent the user from wondering if he or she has accidentally stumbled away from the site.

However, great care must be taken when choosing the colors to be used in a web page, since the wrong combinations could make a page unreadable. Take care to avoid background and text colors that are too similar to each other. Also, in order for the user to know where to click, links should stand out from the rest of the text body. Use one different color each for the text and links – simply underlining links that have the same color as the surrounding text is better than nothing, but is still a poor course of action. The website for Cinderella Photography, in Figure 1-3, makes both of these mistakes.

Figure 1-3: The website for Cinderella Photography <www.photographertoronto.com> has a color scheme that severely hinders legibility and ease of navigation.

Images and Media

Given the adage "A picture is worth a thousand words", the use of images and other media in a website can greatly expand the information available to the user. Adding all this

content comes at a price, however, as they must take extra time in order to load onto the user's Internet browser. In a day and age where high-speed Internet usage is growing rapidly, it is easy to forget that dial-up modems are the only connectivity option for a considerable handful of users. Even among high-speed Internet customers, some services are slower than others. If pages do not load fast enough for these customers, then they will not wait for them to load, and the potential business with those people will be lost.

Other forms of media, such as video and Flash animations, fall into this category. When using any kind of media, including pictures, the information presented therein should be included in some alternate form, usually text, for those who are unable to load it. For example, a common practice on websites is to use a Flash animation or picture as the front page. While this may annoy the user, since he or she must wait to get to the main content, regardless of the connection speed, most instances of this include a link to skip the animation and go straight to the next page. Some web design experts decry the use of these front page animations in the first place, but if they must be included, a workaround should be included (Flanders, 1996).

Chapter 2

Experiment Background

The purpose of this section is to explain the development of the survey used in this experiment, the site that is to be tested, and the contents and procedures of the survey.

Designing the Survey

The original version of this survey, drafted in the summer of 2009, asked users to evaluate the usability attributes of several sites, including some that were mentioned in section 1 of this thesis. A test of this beta version, however, caused some confusion for the user, and did not show a relationship between the usability attributes of the sites featured and whether or not the user would prefer to continue using those sites. As such, a decision was made later on to focus on just one site, Penn State Webmail.

"Usability Services at the University of Maryland: Who, What and How", a document written by Gina M. Jones (2001) of the University of Maryland discusses various methods of evaluating website usability. The following is a section from that document which provides a sample outline for an online survey.

1. The online survey can be tailored to user needs. It consists of questions on:
    a. Background:
        Age
        Level of Education
        University affiliation
        Department or program

b. System Experience

Site familiarity

Site usage

World Wide Web usage and experience

Browser version

c. Overall User Reactions

d. Content

Link relevancy

Content relevancy

Satisfied/unsatisfied information needs

The actual survey, which will be explained in detail later on in this chapter, follows a similar format to the one described above. There is a section on user background, including a question on system experience. The main difference is that the focus is less on content and more on the ease of tasks that can be performed on the site.

Test Subject

The website to be used as the subject of the following experiment is Penn State Webmail (http://webmail.psu.edu), a free, Internet browser-based e-mail client for students of the Pennsylvania State University.

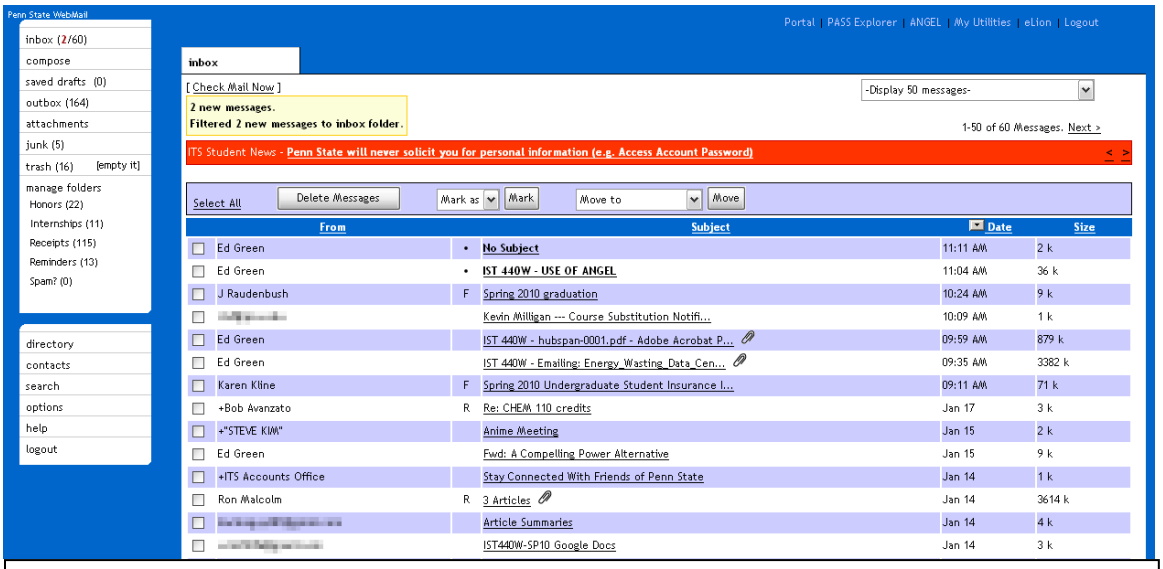

Figure 2-1: The pages of Penn State Webmail use the three-panel layout.

As shown in the screenshot above, Penn State Webmail follows the three-panel page layout described in section II.A. Links to other Internet-based services offered by Penn State are listed along the top of the page. On the left side of the page, there are links to the different pages of the Penn State Webmail site; for example, the inbox, folders, and list of contacts. Both sets of links are present on every page throughout the Webmail site.

The pages for the inbox, outbox, trash, and other folders list the e-mail messages contained within. These lists may be sorted, according to sender/recipient name, subject name, date sent/received, and size, by clicking the header of a particular column. Different cues help the user identify messages that are unread (the message's subject is boldfaced and a dot is placed to the left of it), have been replied to (an 'R' is placed to the left of the title), forwarded (an 'F' is placed to the left of the title), or have an attached file (a small image of a paperclip is placed to the right of the title). These cues may not seem intuitive, but are present in many other e-mail clients, so experience with other such services may make using Penn State Webmail easier.

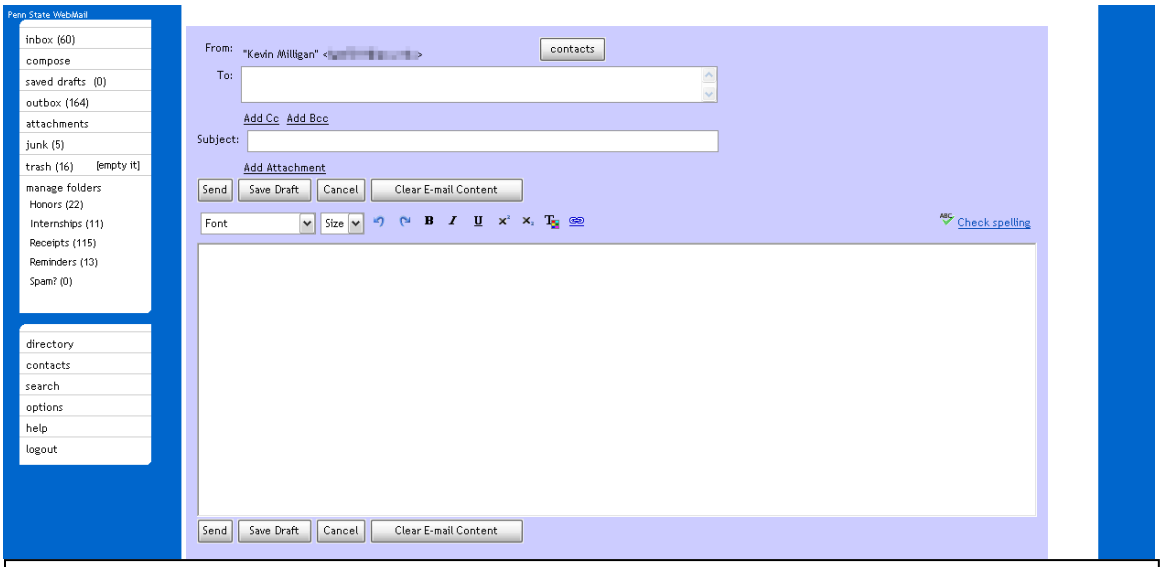

Figure 2-2: The page for writing and sending messages is similar to those found in other e-mail services.

Many other aspects of Penn State Webmail share similarities with other e-mail services. In particular, the page for composing a message uses a familiar format for users of other e-mail clients. The fields for writing recipient addresses and the message subject are placed at the top of the page. However, the fields for adding carbon copy addresses are initially hidden, and must be accessed by clicking the links “Add CC” or “Add BCC” below the recipient address field. Given these fields’ relative lack of use, it is not as much of an issue to have them hidden in this manner. On the contrary, this could possibly prevent confusion for users who would otherwise be unsure as to which field (To, CC, or BCC) to put their target address into.

Below the address field is another, larger field for typing the message itself. Controls for adjusting the font, text size, and text style are all located above the message field, as they are in other e-mail services, as well as word processing programs like Microsoft Word. This demonstrates the importance of consistency based on outside programs which the user may be familiar with. A row of four buttons, labeled “Send”, “Save Draft”, “Cancel”, and “Clear E-Mail Content”, lay above and below the message field. Having these file operation buttons in both

places makes them easier to find in a hurry. It also makes sense to have the "Send" button come first in this row, as it is the option that users tend to select most often.

Services also exist on Penn State Webmail that prevent the user from having to remember e-mail addresses and run the risk of making an error while typing it in. First, Penn State Webmail offers a directory, where users can search for a student or faculty member by their name or Penn State user ID. Once the desired person is listed, the user may click one of the buttons below his or her entry to directly send a message to that person, or to add him or her to the user's contact list. There is a small problem with searching according to full name, as demonstrated in the figure below. Full name searches are based on the exact name provided by the user, so if even one letter is off, there is no guarantee that the desired results will turn up. This is problematic for when people meet each other for the first time, when the other person's name might not be remembered clearly.

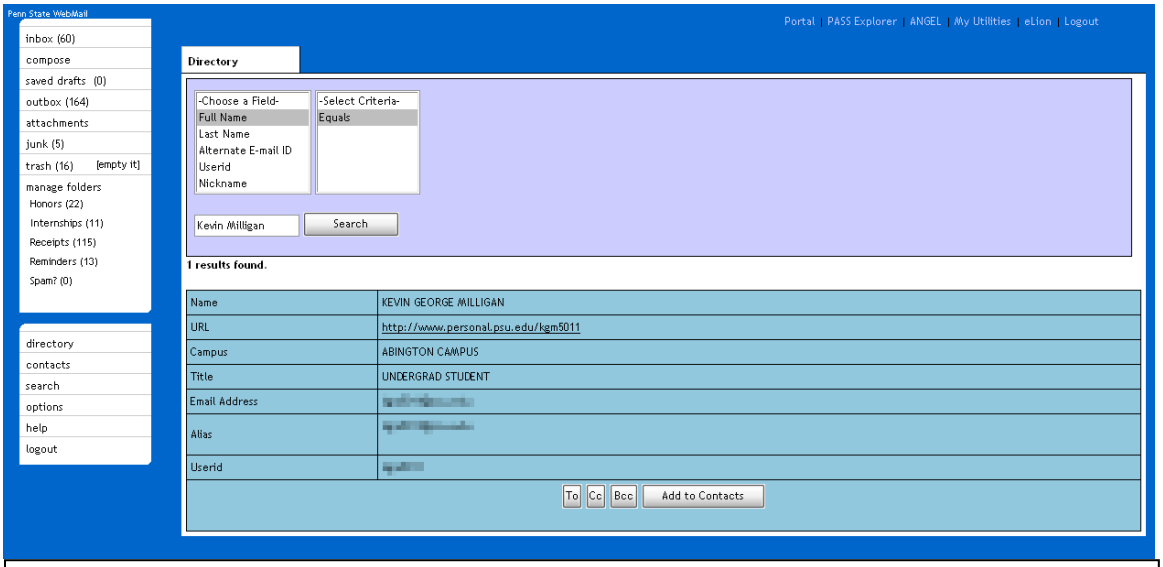

Figure 2-3: The directory search service. Note that the full (first and last) name must match the entries exactly.

Once the desired person is found and added to the user's contacts, the address book may be accessed by clicking on the "Contacts" tab in the lower part of the left-hand navigation panel. Buttons labeled "To", "CC", and "BCC" will send the user to the compose message page with the

address already inserted into the corresponding field. Alternately, this list may be accessed while writing a message by clicking on the button labeled "Contacts" next to the address field. When accessed in this manner, the list opens in a separate pop-up window, so as not to take the user away from the compose message page. This is very considerate on the part of the developers of Penn State Webmail, as having to leave the page might result in the message being erased.

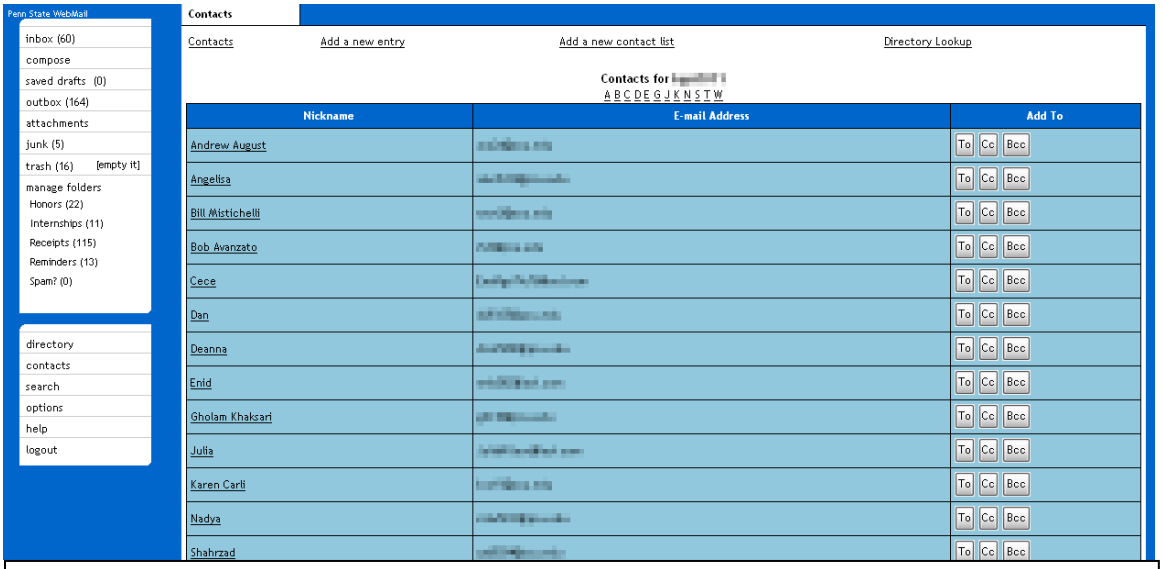

Figure 2-4: The contacts list. Messages can be prepared with the desired address already filled in by clicking on one of the buttons in the right-hand column.

Process

This experiment will be conducted by requesting a group of students at Penn State Abington to fill out a survey online. The survey, hosted at the website eSurveysPro (http://www.esurveyspro.com) features six sections in which the students are asked to complete certain tasks on Penn State Webmail and answer questions regarding their experiences using the site. The six sections of this survey are as follows:

1. Personal information: In this section, basic demographic information is asked in order to create an image of what kinds of students use Penn State Webmail the most.

Question	Responses				
1) Major:					
2) Class standing:	Freshman	Sophomore	Junior	Senior	Post-senior
3) Gender:	Male		Female		
4) How often do you use Penn State Webmail?	Multiple times a day	Once a day	Multiple times a week	Once a week	Less than one a week or never

Table 2.1: The questions asked in section 1 of the survey.

2. Task #1: In this section, the users are asked to write and send an e-mail message using Penn State Webmail. The questions in this section ask if the task was easy for the user to accomplish, and if any error messages presented (if any appeared) were clear and understandable.

Question	Responses				
5) It was easy to write and send a message using Penn State Webmail.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
6) I did not require any help to write and send a message using Penn State Webmail.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
7) If I received any error messages, their instructions on how to deal with the error were clear. (If you did not receive any error messages, please leave this blank.)	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)

Table 2.2: The questions asked in section 2 of the survey.

3. Task #2: In this section, the users are asked to search for any person using the directory function and add him or her to their list of contacts using Penn State Webmail. The questions asked are identical to those in section 2.

Question	Responses				
8) It was easy to search for a person and add him or her to my contacts list using Penn State Webmail.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
9) I did not require any help to search for a person and add him or her to my	1 (Strongly	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly

contacts list using Penn State Webmail.	Disagree)				Agree)
10) If I received any error messages, their instructions on how to deal with the error were clear. (If you did not receive any error messages, please leave this blank.)	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)

Table 2.3: The questions asked in section 3 of the survey.

4. Task #3: In this section, the users are asked to create a folder and add a message to it using Penn State Webmail. The questions asked are identical to those in section 2.

Question	Responses				
11) It was easy to create a folder and add a message to it using Penn State Webmail.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
12) I did not require any help to create a folder and add a message to it using Penn State Webmail.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
13) If I received any error messages, their instructions on how to deal with the error were clear. (If you did not receive any error messages, please leave this blank.)	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)

Table 2.4 The questions asked in section 4 of the survey.

5. Comparison to Other Webmail Clients: In this section, the users are asked if they use any other Internet browser-based e-mail clients. If so, they are asked to identify it, repeat tasks 1 through 3 with the other client, and answer whether or not these tasks were easier to accomplish on Penn State Webmail as opposed to the other client.

Question	Responses				
14) Do you use any other webmail services?* (**If no, skip to question 19 now.**)	Yes		No		
15) The webmail client I use most often is:	(Text Box)				
16) Writing and sending a message **was easier to do on Penn State Webmail** than on the other service.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
17) Searching for a person and adding him/her to my contacts **was easier to do on Penn State Webmail** than on the other service.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)

18) Creating a folder and adding a message to it **was easier to do on Penn State Webmail** than on the other service.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)

*A webmail service refers to any e-mail service accessed over an Internet browser, for example Gmail or Hotmail. A stand-alone e-mail program, such as Microsoft Outlook, **does not count** as a webmail service.

Table 2.5: The questions asked in section 5 of the survey.

6. Overall Questions: In the final section, the users are asked a variety of general questions regarding their experiences using Penn State Webmail. The final question in this section allows users to write any suggestions they may have for improving their experience on Penn State Webmail.

Question					
19) The text was easy to read.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
20) The color choices were pleasing and not distracting.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
21) I was able to navigate without difficulty.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
22) The site was designed consistently.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
23) I would continue to use this site in the future.	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
24) If you have any recommendations for change, please write them here.	(Text box)				

Table 2.6: The questions asked in section 6 of the survey.

Chapter 3

Experiment Results

Out of the 125 IST students to whom invitations to complete this survey were sent, 26 (20.8%) of the students answered the survey in part or in whole. Their results will be displayed in graph form. Each section of questions will be analyzed separately, followed by a conclusion of all the results in the next and final chapter. Percentages will be provided throughout this chapter. Note that when "Combined Agreement" percentages are mentioned, this refers to the sum of the "Agree" and "Strongly Agree" totals. Likewise, "Combined Disagreement" is the sum of the "Disagree" and "Strongly Disagree" totals. All percentages are taken against the total number of responses, not including those who skipped the question, unless otherwise noted.

Section 1: Personal information

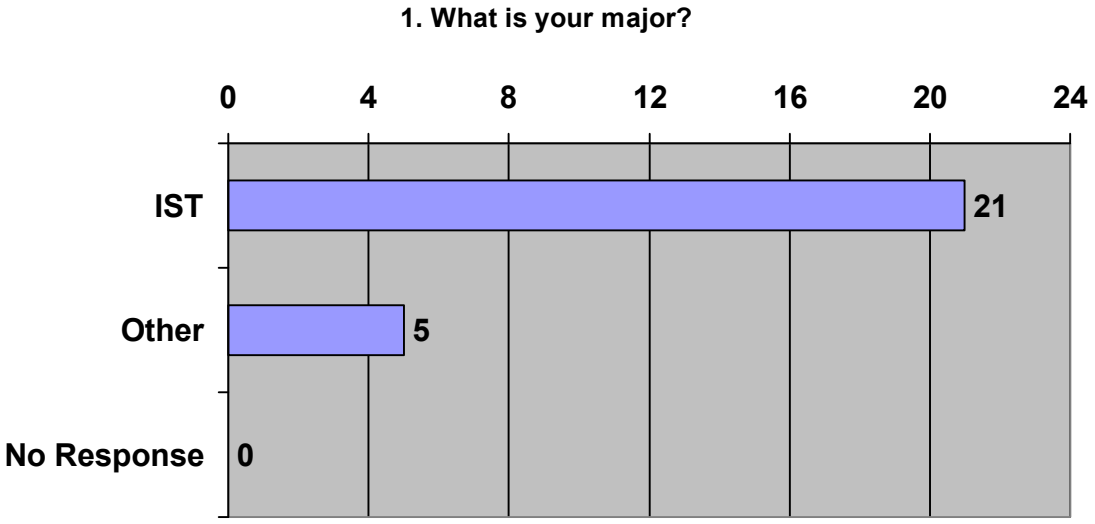

Figure 3-1: The results for question 1 of the survey.

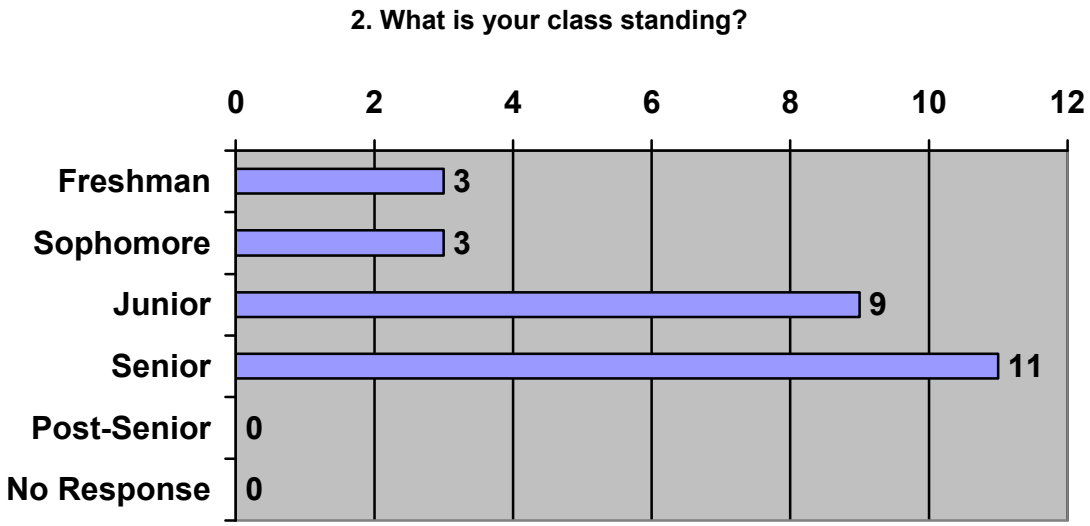

Figure 3-2: The results for question 2 of the survey.

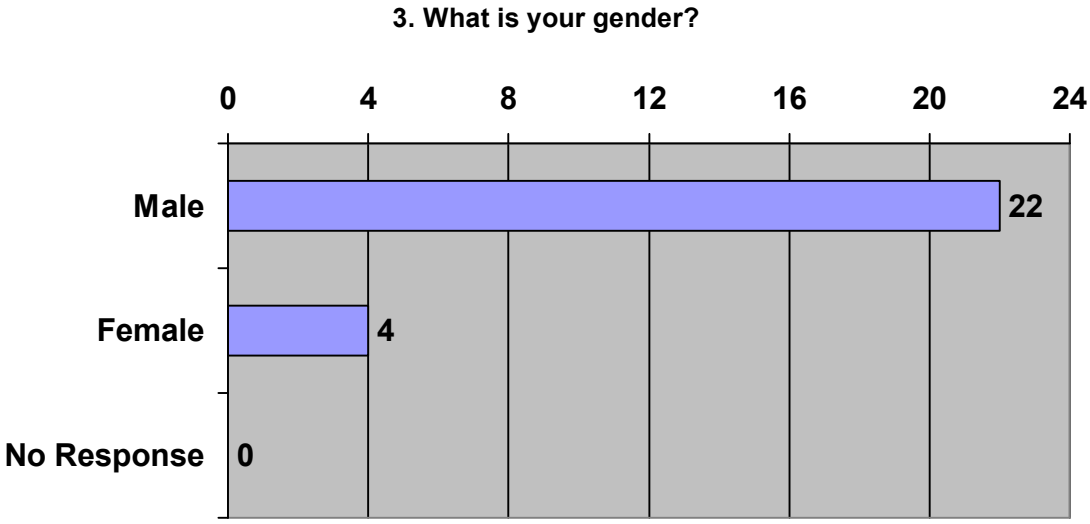

Figure 3-3: The results for question 3 of the survey.

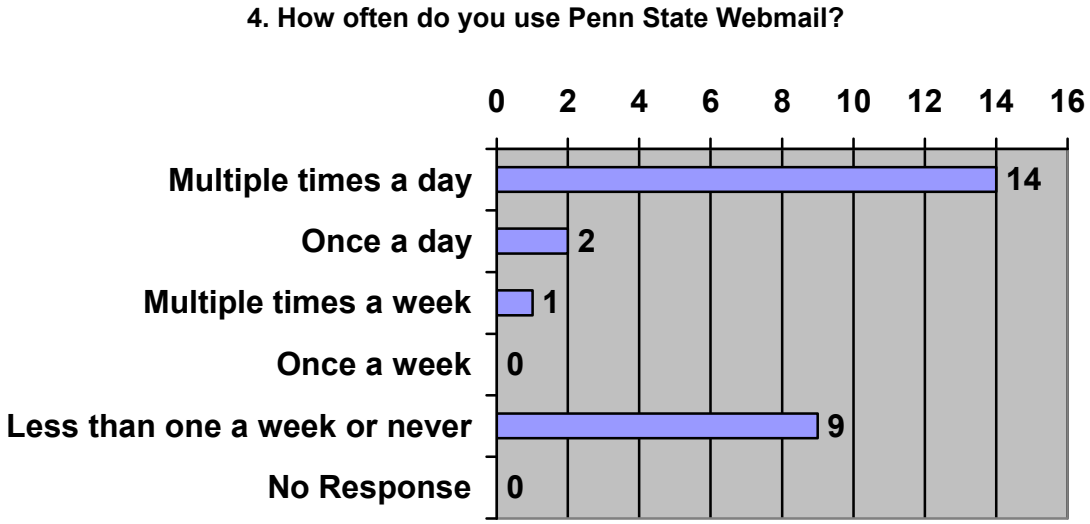

Figure 3-4: The results for question 4 of the survey.

According to the responses given questions #1-3, the average Penn State Webmail user is an IST major (81%), male (85%), and is in his final or second-to-final year of studies (Junior 35%, Senior 42%). All 26 of the people who took part in this survey answered question #4, "How often do you use Penn State Webmail?", as shown in Figure 3-4. 17 of the students (65%) claimed to use Penn State Webmail once a week or more, and the other 9 (35%) said they use it less than once a week, if at all.

Note that question #1, "What is your major", is a free-response question, where users can type in the name of whatever their major is. At over eighty percent, "IST" received a by-and-large majority of the majors given, but the other majors listed include "Corporate Communications", "Computer Science", "Black Studies", and "Undecided".

Section 2: Writing and sending a message

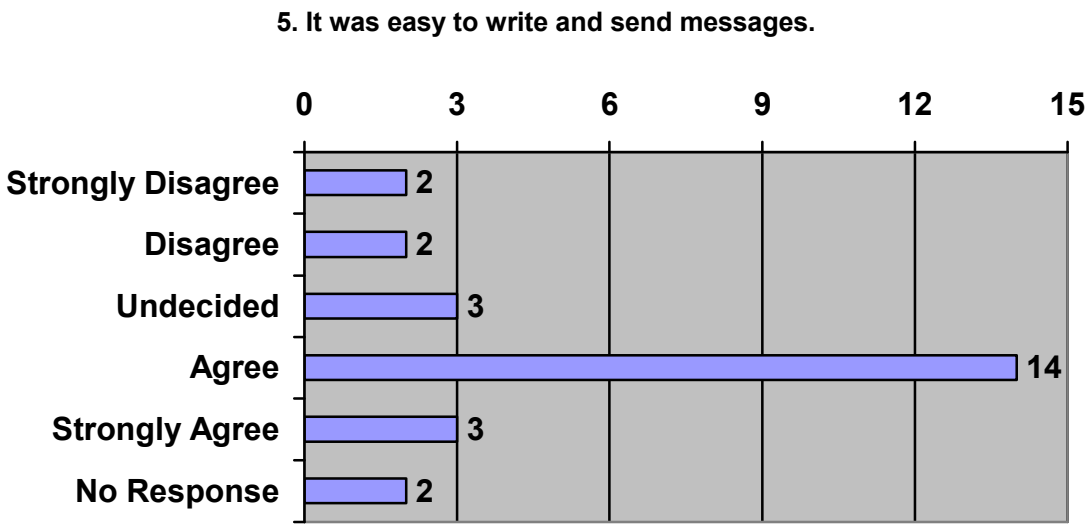

Figure 3-5: The results for question 5 of the survey. (Average=3.583)

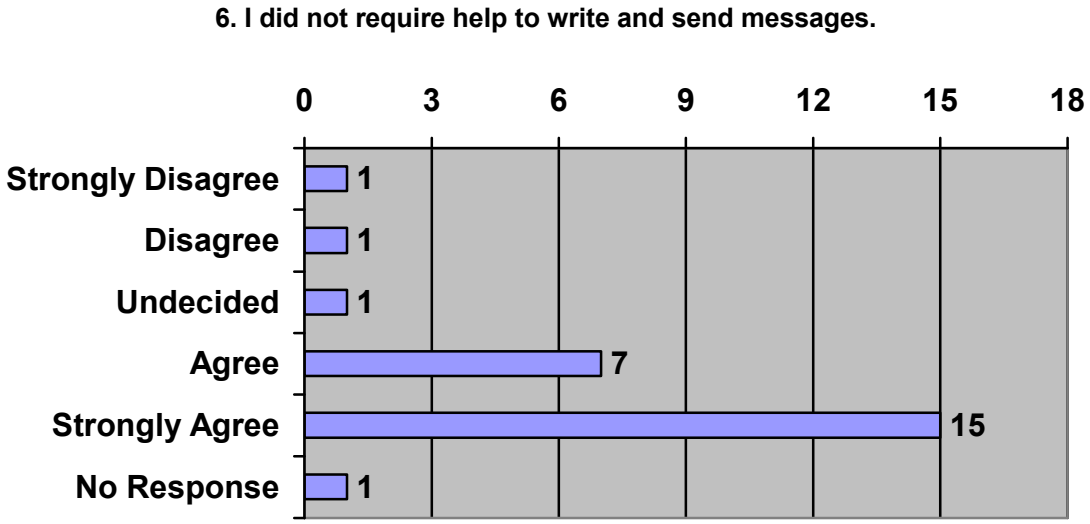

Figure 3-6: The results for question 6 of the survey. (Average=4.360)

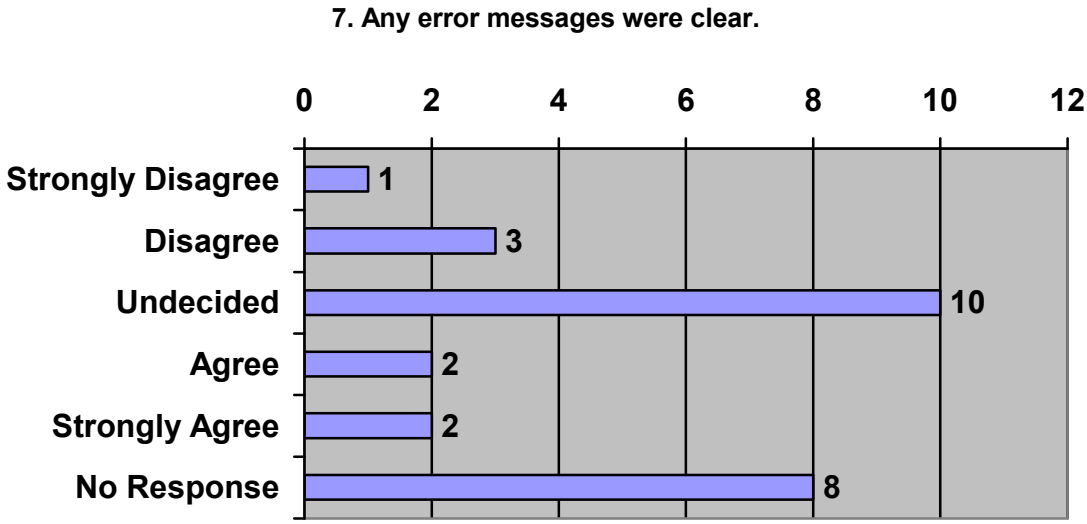

Figure 3-7: The results for question 7 of the survey. (Average=2.611)

Based on the data collected from questions #5 and 6, the majority of respondents found it at least easy to write and send messages, and required little to no help to do so. An overwhelming number of people agreed with the statement "It was easy to write and send a message using Penn State Webmail" (Combined Agreement 71%) and strongly agreed with the statement "I did not require any help to write and send a message using Penn State Webmail" (Combined Agreement 88%). As this is a common task for users to perform, it is lucky that it comes easily to so many.

Even though the responses for question #7, "If I received any error messages, their instructions on how to deal with the error were clear", were split nearly evenly between agreement and disagreement, many of the users said that they did not encounter any error messages at all. Keep in mind the possibility that users might have answered "Undecided" even if they did not encounter any errors at all. As such, combining the value of "Undecided" and "No Response" creates a grand total of 18 out of 26 (69%), possibly proving that error messages were few and far between. Out of those who did encounter error messages, the rates of combined agreement and disagreement are equal (4/26, 15%), which does not prove any kind of consensus about the error messages.

Section 3: Finding and managing contacts

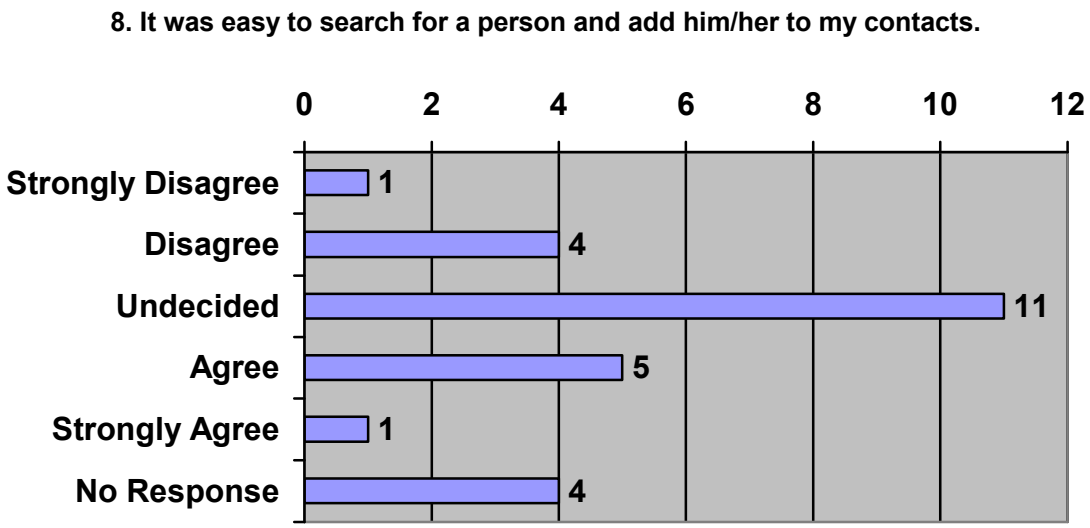

Figure 3-8: The results for question 8 of the survey. (Average=3.045)

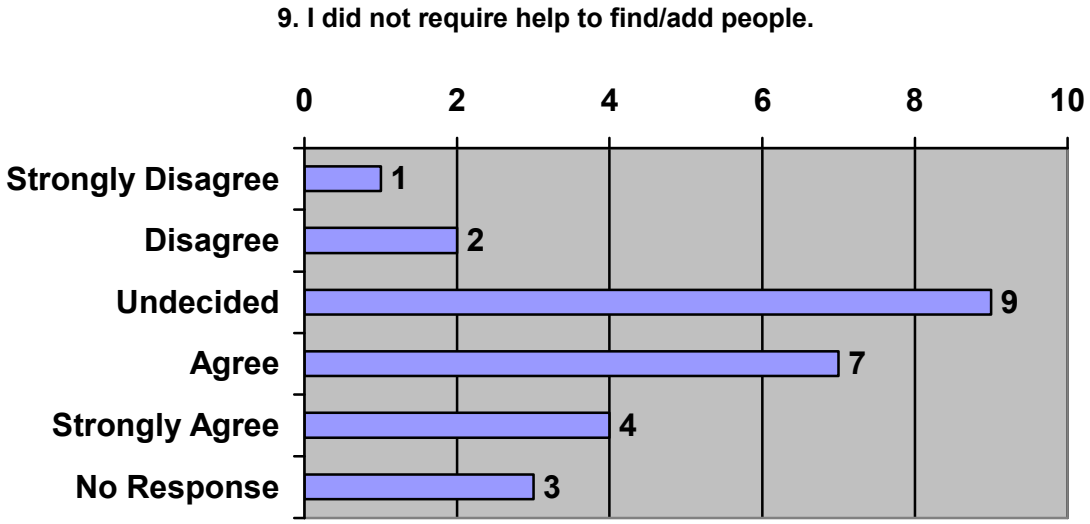

Figure 3-8: The results for question 9 of the survey. (Average=3.478)

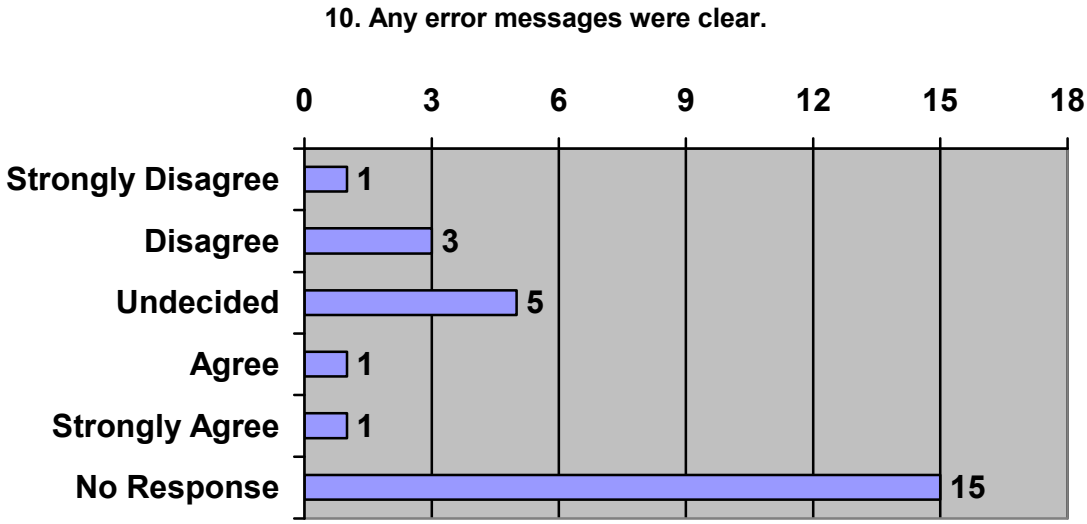

Figure 3-9: The results for question 10 of the survey. (Average=2.818)

Responses for the questions #8 and 9 were more varied and indecisive than for the first. More users likely had trouble with searching for and managing contacts than they did simply writing messages. Note that even though the responses for question #8, "It was easy to search for people and add them to my contacts", were mainly on the fence (Undecided 50%), the responses for question #9, "I did not require any help to search for people and add them to my contacts," were slightly more positive (Undecided 39%, Combined Agreement 48%).

For question #10, "If I received any error messages, their instructions on how to deal with the error were clear", the combined value of "Undecided" and "No Response" is 20 out of 26 (77%). Again, it appears as though few users received an error message of any kind. Among those who did encounter error messages, there was a slight majority for combined disagreement (4/26, 15%) against combined agreement (2/26, 8%), indicating that error messages relating to this task may be too vague for some users to follow.

Section 4: Creating and managing folders

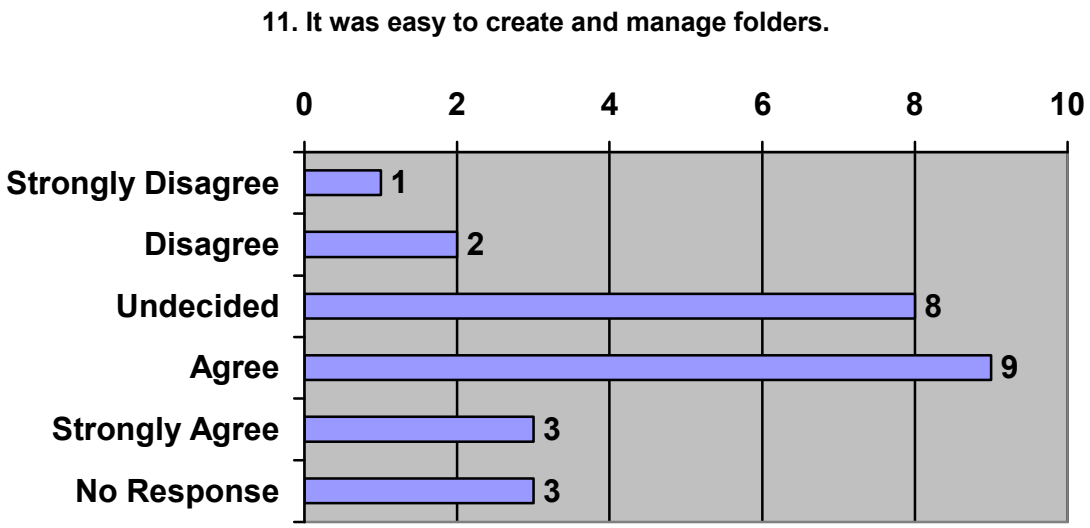

Figure 3-11: The results for question 11 of the survey. (Average=3.478)

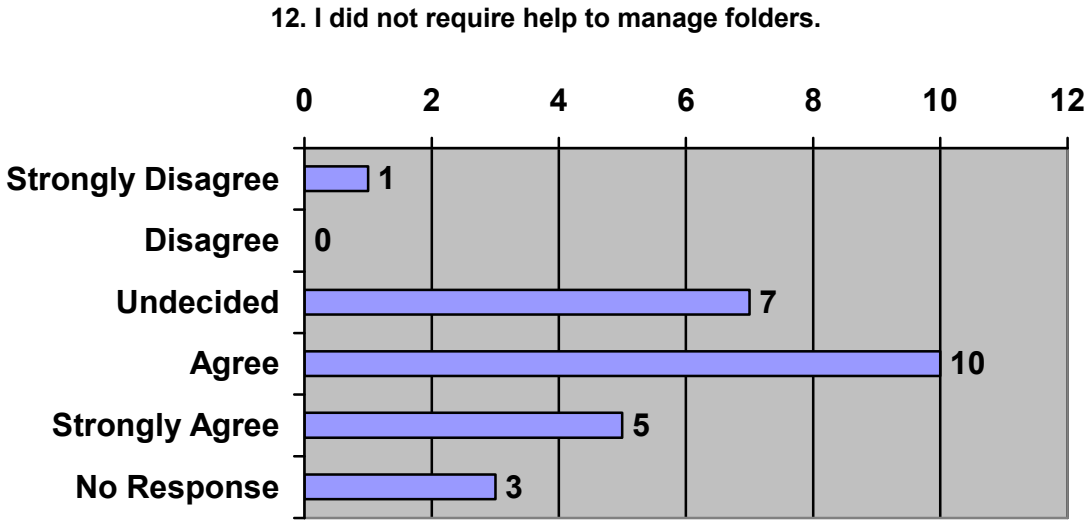

Figure 3-12: The results for question 12 of the survey. (Average=3.565)

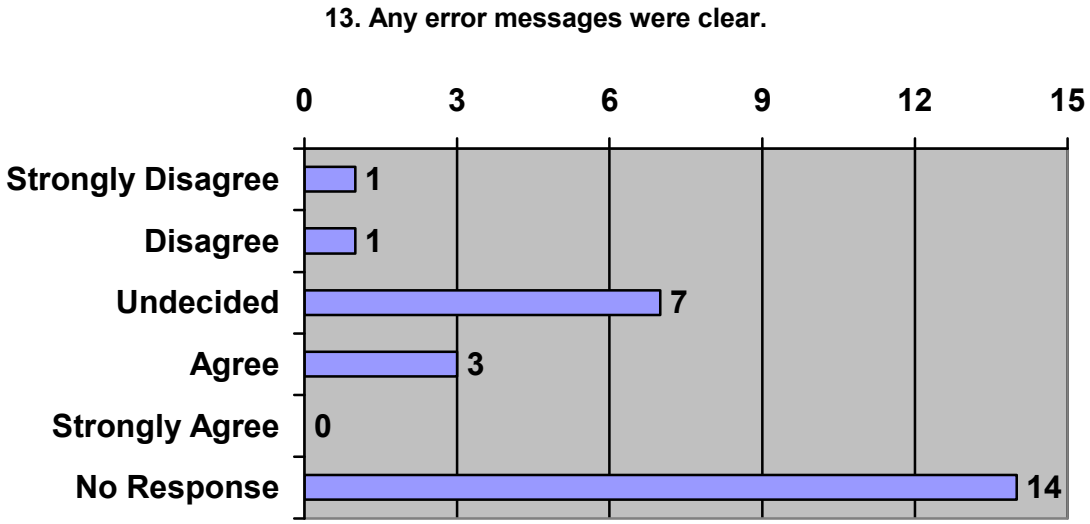

Figure 3-13: The results for question 13 of the survey. (Average=3.000)

Again, most respondents found it easy to create and manage folders, but the amount of positive responses was in between those of the first and second tasks. Most respondents answered either "Undecided" or "Agree" for both question #11, "It was easy to create a folder and add a message to it using Penn State Webmail" (Undecided 35%, Agree 39%), and question #12, "I did not require any help to create a folder and add a message to it using Penn State Webmail" (Undecided 30%, Agree 43%).

Question #13, "If I received any error messages, their instructions on how to deal with the error were clear", once again received a high number of users who claimed to have not encountered any error messages. The combined total of the "Undecided" and "No Response" columns is 21 out of 26 (81%). Out of those who did receive error messages, the rates of combined disagreement (2/26, 8%) and agreement (3/26, 12%) were similar, not indicating any particular consensus on the matter.

Section 5: Comparison with other webmail clients

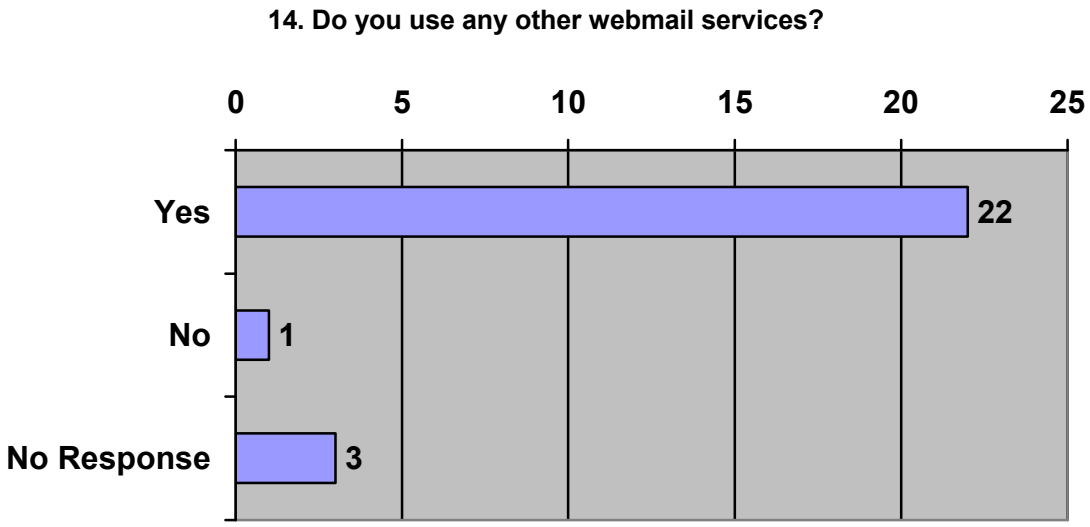

Figure 3-14: The results for question 14 of the survey.

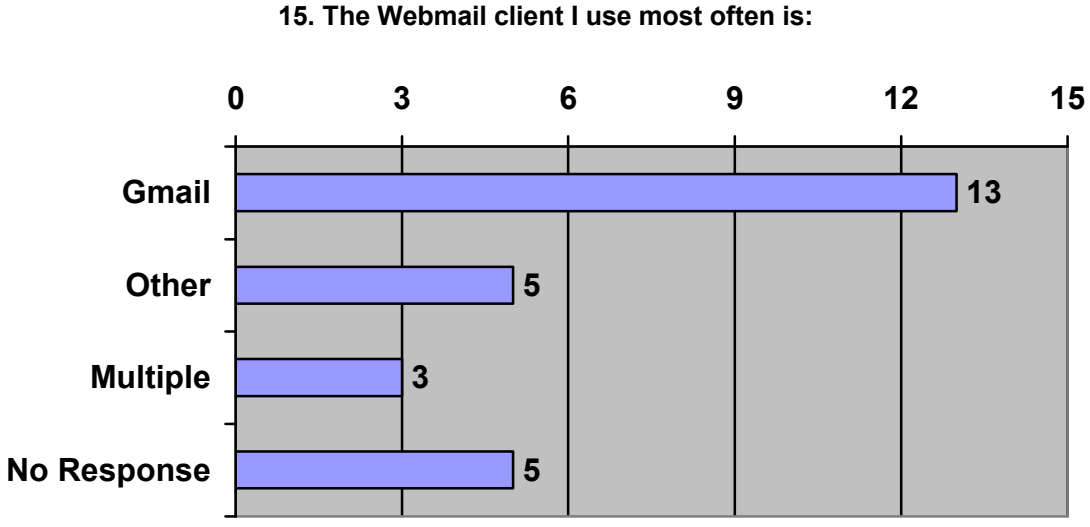

Figure 3-15: The results for question 15 of the survey.

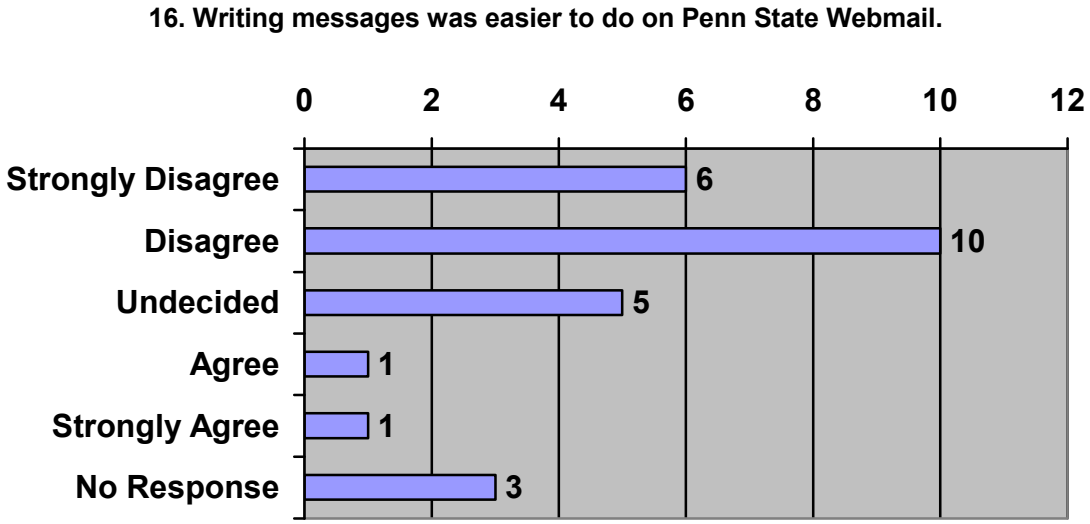

Figure 3-16: The results for question 16 of the survey. (Average=2.174)

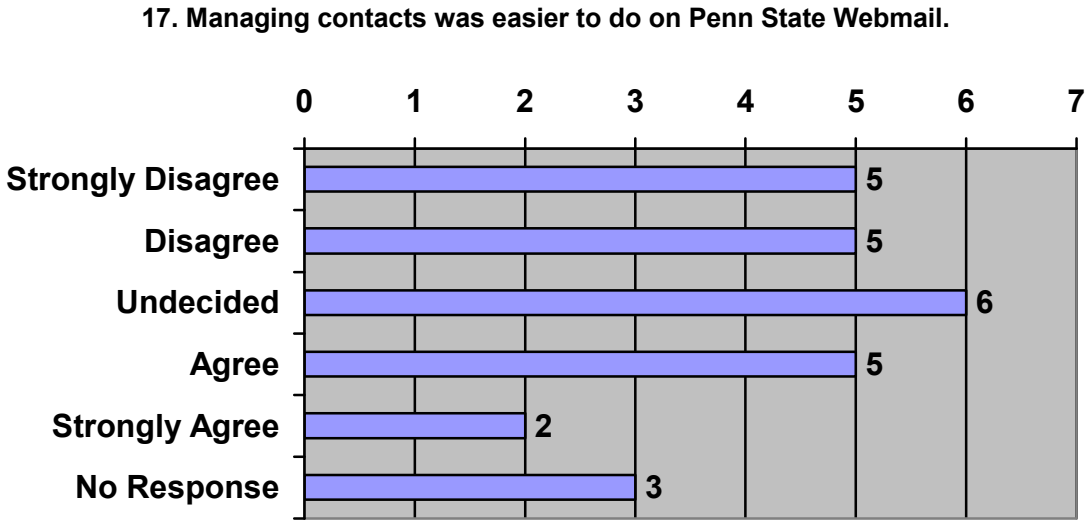

Figure 3-17: The results for question 17 of the survey. (Average=2.739)

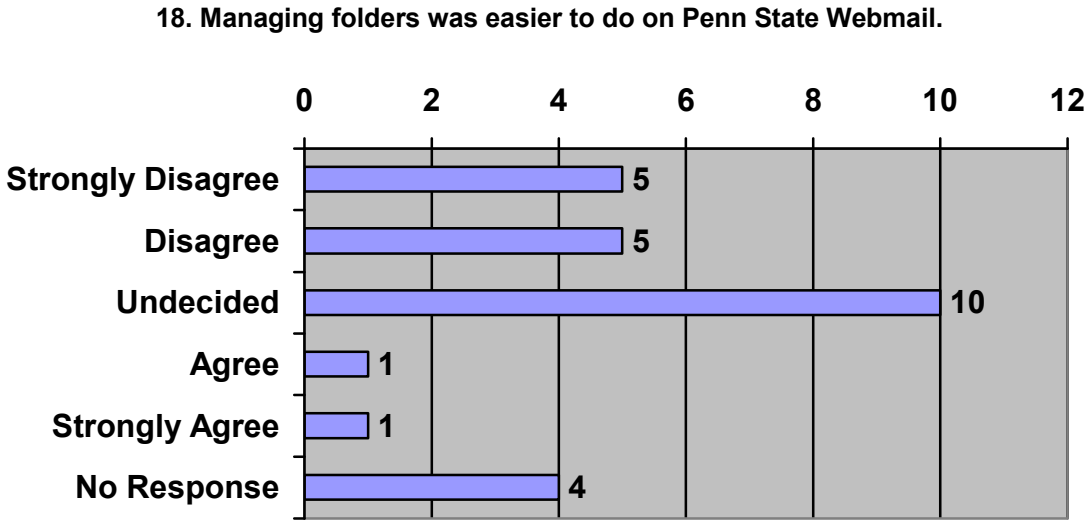

Figure 3-18: The results for question 18 of the survey. (Average=2.455)

Nearly all of the respondents have e-mail experience outside of Penn State Webmail (96%), with Google's Gmail being the client of choice (62%). Across the board, users had a better time of doing the tasks on those other clients than on Penn State Webmail. In the data shown in Figure 3-16, there is a small majority of "Disagree" responses (43%), followed by "Strongly Disagree" (26%) and "Undecided" (22%). This led to question #16, which asks whether or not "Writing and sending a message was easier to do on Penn State Webmail than on the other service", having the lowest average out of all the questions in the entire survey, weighted at just under 2. (For more information on how the responses are averaged, please read the Summary section of Chapter 3.)

Figure 3-17 shows that most of the response totals for question #17, "Searching for a person and adding him/her to my contacts was easier to do on Penn State Webmail than on the other service", hovered around the 20% mark, except for "Strongly Agree", which was relatively lower (8%). Question #18, "Creating a folder and adding a message to it was easier to do on Penn State Webmail than on the other service", showed equal indecision and combined disapproval (45%)

Section 6: Overall questions

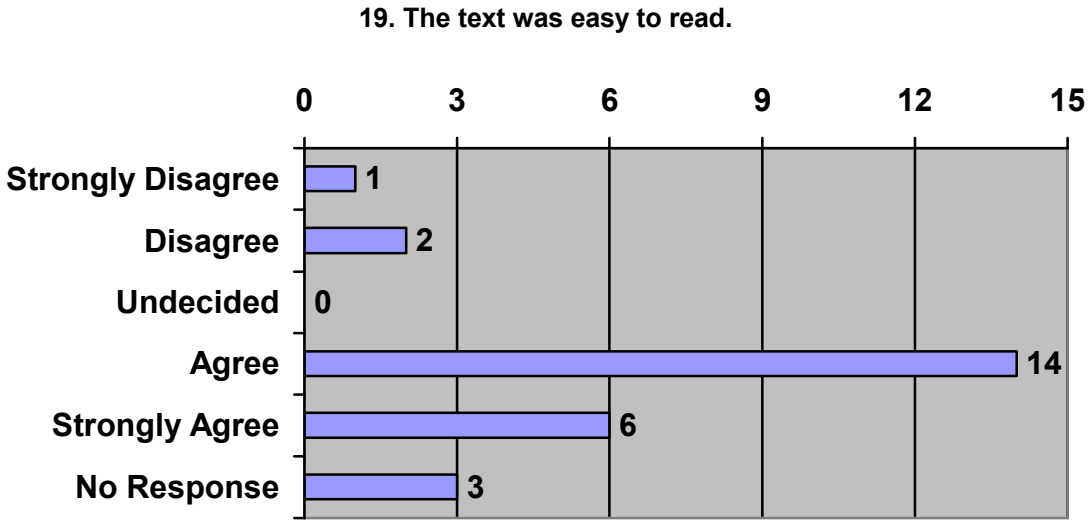

Figure 3-19: The results for question 19 of the survey. (Average=3.739)

Figure 3-20: The results for question 20 of the survey. (Average=3.826)

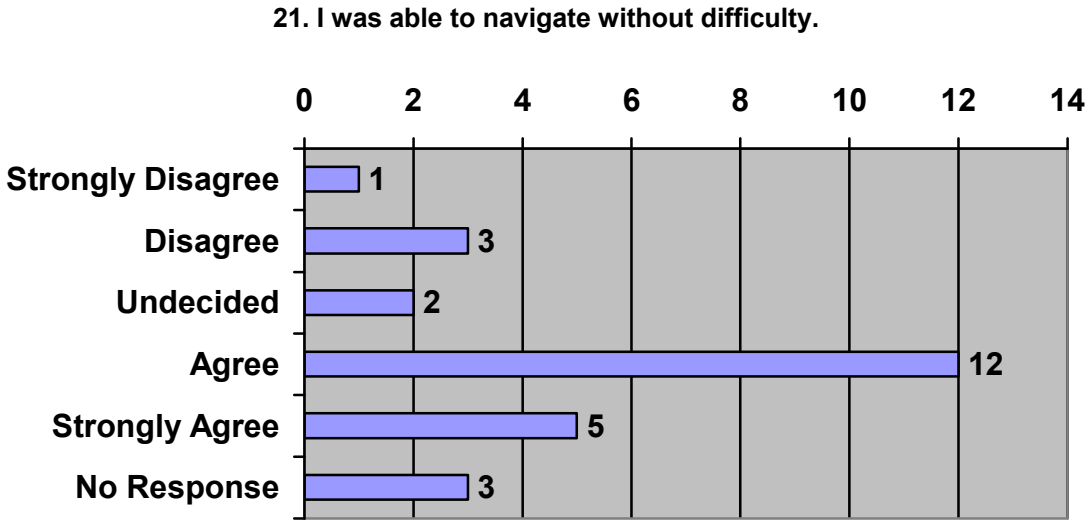

Figure 3-21: The results for question 21 of the survey. (Average=3.739)

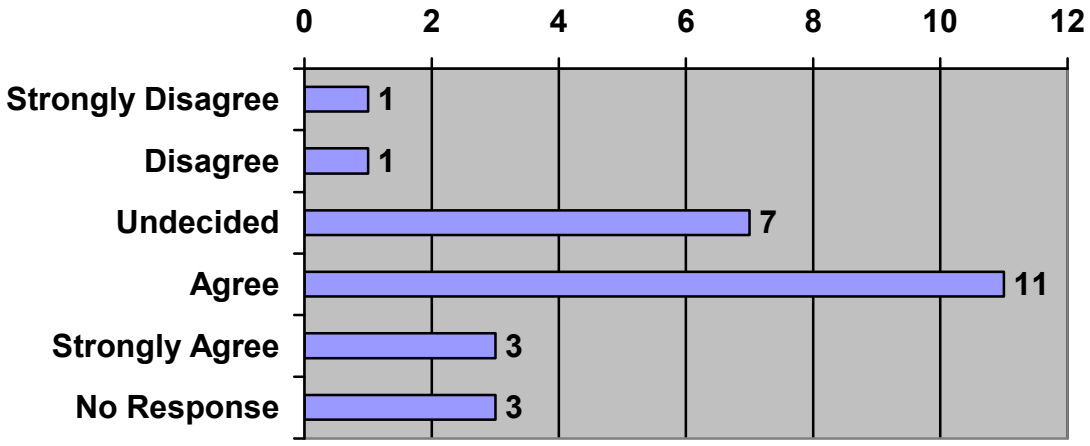

Figure 3-22: The results for question 22 of the survey. (Average=3.609)

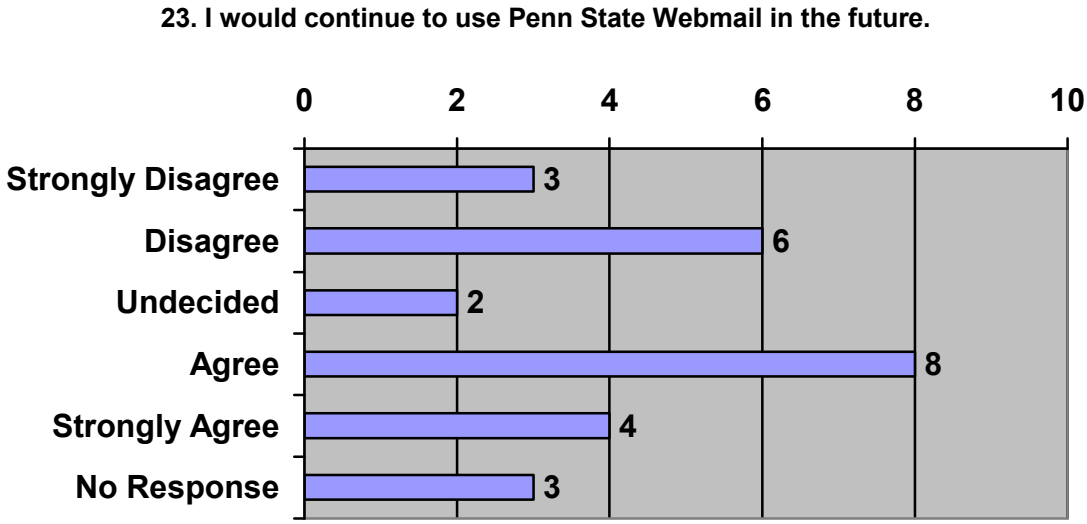

Figure 3-23: The results for question 23 of the survey. (Average=3.174)

When asked about qualities that pertain to websites in general, such as those explained in Chapter 2, Penn State Webmail ranked positively. There were large numbers of "Agree" responses for questions #19-21, "The text was easy to read" (61%), "The color choices were pleasing and not distracting" (52%), and "I was able to navigate without difficulty" (52%) came back positive. Even question #22, "The Penn State Webmail site was designed consistently" was agreed with by most, although the number of "Agree" responses (48%) was close to that of the "Undecided" option (30%).

Yet when asked if they would like to continue using Penn State Webmail in the future, the responses were mixed. Figure 3-23 shows that the percentage of those who agreed (Combined Agreement 53%) with the statement was followed closely by those who disagreed (Combined Disagreement 39%) with it. So what is the "x-factor" that turned some of them off of this service? The answer will be discussed in the next chapter, where we will also examine the suggestions given in question #24, the final free-response question of the survey.

Summary

The following chart, Table 3-1, lists all the answers for questions with quantifiable responses, along with the average value. The averages are determined by multiplying the number of responses for a particular choice by a certain weight. "Strongly Disagree" is weighted by a value of 1, "Disagree" by 2, "Undecided" by 3, "Agree" by 4, and "Strongly Agree" by 5. Then, all five products are added and the sum is divided by the total number of answers (respondents who declined to give any response to a question are not included in this total, and are listed in a separate column on the chart below). For example, the formula for question 5's average is as follows: (2*1 + 2*2 + 3*3 + 14*4 + 3*5) / 24 = 86 / 24 = 3.583

Section 1: Personal Information							
Question	IST			Other			No Response
1) Major	21 (81%)			5 (19%)			0
	Freshman	Sophomore	Junior	Senior	Post-senior		No Response
2) Class standing	3 (12%)	3 (12%)	9 (35%)	11 (42%)	0 (0%)		0
	Male			Female			No Response
3) Gender	22 (85%)			4 (15%)			0
	Over once a day	Once a day	Over once a week	Once a week	Under once a week		No Response
4) Rate of use	14 (54%)	2 (8%)	1 (4%)	0 (0%)	9 (35%)		0
Section 2: Writing and sending a message							
Question	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Average (Total)	No Response
5) Ease of task	2 (8%)	2 (8%)	3 (13%)	14 (58%)	3 (13%)	3.583 (24)	2
6) No help	1 (4%)	1 (4%)	1 (4%)	7 (28%)	15 (60%)	4.360 (25)	1
7) Clear error messages	1 (6%)	2 (11%)	8 (44%)	2 (11%)	2 (11%)	2.611 (18)	8

Section 3: Finding and managing contacts							
8) Ease of task	1 (5%)	4 (18%)	11 (50%)	5 (23%)	1 (5%)	3.045 (22)	4
9) No help	1 (4%)	2 (9%)	9 (39%)	7 (30%)	4 (17%)	3.478 (23)	3
10) Clear error messages	1 (9%)	3 (27%)	5 (45%)	1 (9%)	1 (9%)	2.818 (11)	15
Section 4: Creating and managing folders							
11) Ease of task	1 (4%)	2 (9%)	8 (35%)	9 (39%)	3 (13%)	3.478 (23)	3
12) No help	1 (4%)	0 (0%)	7 (30%)	10 (43%)	5 (22%)	3.565 (23)	3
13) Clear error messages	1 (8%)	1 (8%)	7 (58%)	3 (25%)	0 (0%)	3.000 (12)	14
Section 5: Comparison with other webmail clients							
Question	Yes			No			No Response
14) Other services?	22 (85%)			1 (15%)			3
	Gmail		Other		Multiple		No Response
15) Name of service	13 (62%)		5 (24%)		3 (14%)		5
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Average* (Total)	No Response
16) Writing messages	6 (26%)	10 (43%)	5 (22%)	1 (4%)	1 (4%)	2.174 (23)	3
17) Managing contacts	5 (22%)	5 (22%)	6 (26%)	5 (22%)	2 (9%)	2.739 (23)	3
18) Managing folders	5 (23%)	5 (23%)	10 (45%)	1 (5%)	1 (5%)	2.455 (22)	4
Section 6: Overall questions							
19) Legible text	1 (4%)	2 (9%)	0 (0%)	14 (61%)	6 (26%)	3.739 (23)	3
20) Pleasing colors	2 (9%)	1 (4%)	2 (9%)	12 (52%)	6 (26%)	3.826 (23)	3
21) Easy navigation	1 (4%)	3 (13%)	2 (9%)	12 (52%)	5 (22%)	3.739 (23)	3
22) Designed consistently	1 (4%)	1 (4%)	7 (30%)	11 (48%)	3 (0%)	3.609 (23)	3
23) Would return	3 (13%)	6 (26%)	2 (9%)	8 (35%)	4 (17%)	3.174 (23)	3

Table 3-1: The responses of all the quantifiable questions from the survey and their average values.

Chapter 4

Conclusion

As detailed in the results presented in Chapter 3, the problems that users experienced while using Penn State Webmail stemmed from performing the tasks that the website was designed for.

Among the tasks that this survey based its questions on, writing and sending messages came to users the most easily. Questions #5 and 6, which concerned this task, both returned large numbers of "Agree" and/or "Strongly Agree" responses (Combined Agreement: #5: 71%, #6: 88%). The second task, managing contacts, caused users relatively more trouble. The responses for questions #8 and 9 were more heavily skewed toward the center than in similar questions related to other tasks. Managing folders, the third task, followed the first task closely in terms of claimed ease of use. Most of the responses for questions #11 and 12 were either "Undecided" or "Agree".

The task that most users had trouble with on Penn State Webmail was searching for contacts and managing their address books. As stated in Chapter 2, the university-wide directory will only search for an exact match of what the search terms are. This directory only deals with the students, faculty, and staff of the Pennsylvania State University. Since the total number of people does not even exceed 100,000, according to the University Budget Office's factbook (2009), removing this limitation should not cause an inordinate strain on the servers.

However, even if Penn State Webmail seemed intuitive by its own merits, then it was not as user-friendly compared to other webmail services. According to figure 3-14, 96% of users surveyed had experience with other services, especially Gmail, and disagreed in some degree with the thought that the three tasks were easier to do on Penn State Webmail than whatever else

they had experience with. This may explain the fact that many general website qualities – navigation, legibility, etc. – tested positively, a good deal of those polled wished to never use Penn State Webmail again.

The final question, number 24, was a free-response which told users, "If you have any recommendations for changing Penn State Webmail, write them here". 7 out of the 26 survey-takers (27%) had something to say about this issue. For the most part, each one covered a different issue, if anything specific at all. Some of them were more technical, for example, "Switch to IMAP mail servers", while some detailed a possible solution, such as a very lengthy entry that begins, "Drafts should be automatically saved, and the Directory should be accessible without leaving the Compose screen". Two people both commented on how slow they felt Penn State Webmail to be. One statement reads, "Remove the wait time between checking for new e-mail messages", and another says, "[I]t's slow to receive e-mails. Angel[1] is worse." This first comment brings up an interesting and often annoying quirk of Penn State Webmail. A button on the top-left of the page lets users check their inbox again for new messages, but the system will not let them do so for roughly one minute since the last time the inbox was checked.

This experiment reveals the necessity of having users test not only browsing the website, but performing all the actions available on the site. The common factors of website usability – text legibility, ease of navigation, etc. – were thought of early on in the history of the World Wide Web, when the purpose of web pages was little more than to simply display information. Nowadays, in the era of "Web 2.0", people can do so much more on web pages, from buying physical goods, to writing an online journal, to downloading and uploading data. With so many actions that can be performed on websites these days, if even one of these becomes an unpleasant

[1] ANGEL is a course management system also offered by the Pennsylvania State University. ANGEL is used primarily as a tool for professors to deliver assignments electronically to students, but it also offers a rudimentary e-mail service that allows messages to be sent to the students, faculty, and/or staff of a particular course.

task for users, it could discourage any further use of the site by those users. And if there are no people to visit a company's website, then it loses a valuable channel with which to connect to its market.

In the future, if I were to conduct another survey similar to this one, the thing I would change most compared to this one would be the demographics of the survey-taker body. In this survey, I sent invitations only to students majoring in IST and others who are enrolled in IST courses in the Spring 2010 semester. The idea of collecting more addresses to send invitations to was an impossibility for this survey due to time constraints and possible ethics issues, but could yield more varied results. Another possibility is to make two versions of the survey, each with the exact same questions, and invite only men to one and women to the other. If another company were to conduct its own survey similar to the one from this experiment, expanding the sample size and/or demographics, or separating the results by gender or other factors, it could reveal another side of the data – one that could be used to make the user experience even more streamlined and pleasant than would otherwise be possible.

APPENDIX A

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Letter of Consent

Implied Informed Consent Form for Social Science Research
The Pennsylvania State University

Title of Project: Study of E-mail Website Usability and Design Effectiveness

Principal Investigator: Kevin Milligan, Undergraduate Student
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Advisor: Robert Avanzato, Associate Professor
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Abington, PA 19001
(215) 881-7358; rla5@psu.edu

Dear Student,

I am looking for volunteers to participate in a research project to support my Pennsylvania State university Schreyer Honors College research requirement.

1. **Purpose of the Study:** The purpose of this research is to determine whether or not good or bad website design will affect the business of those websites. A website is an important part of a company's business model. It stands to reason that if a website is well-designed and easy to use, people will use and do business with it more often. I will use this study to determine whether or not it would be in companies' best interests to take more care in designing their websites. Specifically, I will evaluate the usability of the Penn State Webmail system.

2. **Procedures to be followed:** This survey will require you answer questions, based on Penn State Webmail (http://webmail.psu.edu), described in the survey. You may access this survey by clicking on the following link: http://www.esurveyspro.com/Survey.aspx?id=ba977052-8fb3-4ed8-a7ef-199d1078ef19

3. **Duration/Time:** It will take about 10 to 15 minutes to complete the survey.

4. **Statement of Confidentiality:** Your participation in this research is confidential. The survey does not ask for any information that would identify who the responses belong to. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared because your name is in no way linked to your responses. Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties.

5. **Right to Ask Questions:** Please contact Kevin Milligan at (215) 598-7066, or by e-mail at kgm5011@psu.edu, or contact Robert Avanzato at (215) 881-7358 or rla5@psu.edu, with questions or concerns about this study.

6. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer.

You must be 18 years of age or older to take part in this research study.

Completion and return of the survey implies that you have read the information in this form and consent to take part in the research. Please print a copy of this form for your records or future reference.

Sincerely,

Kevin Milligan

Academic Vita

Academic Vita of Kevin G. Milligan

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Thesis Supervisor: Robert Avanzato

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National Honors Society