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Students' perspectives on university web site usability: an evaluation

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STUDENTS' PERSPECTIVES ON UNIVERSITY WEB SITE USABILITY: AN EVALUATION

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DEDICATION

To Joyce…Without your undying support, continuous encouragement, countless sacrifices, and unconditional love, this would not have been possible.

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ABSTRACT

Educational institutions utilize the web to market and promote their products and services. Information about the institution, programs, and courses can be found at the Website. When prospective students visit the institution's Website, the expectation is that questions about a particular program being offered will be answered. As Websites are designed and built differently, it is possible that site visitors will be challenged in getting the answers they need due to Website usability issues.

This study explored the Website usability of four universities. The participants of the study simulated a process where a prospective student has a desire to attend graduate school and looks for a particular graduate program. The participants performed a list of tasks to determine the details of the program such as admission requirements, required courses, and tuition rate.

Data were collected through the use of questionnaires. The participants completed an evaluation after each task and after performing all the tasks. The information provided by the participants was used to answer the following research questions: (a) How did the students rate the difficulty of completing each task? (b) What did the students find most helpful in completing the tasks? (c) What did the students find least helpful in completing the tasks? and (d) How satisfied were the students in using the Website?

The study revealed that not all of the four university Websites were designed and created equally. There were Websites that were easy to use. The information being sought for the task was easily found. There were Websites that were difficult to use. Some of the participants experienced confusion and frustration while attempting to complete the task. There were even tasks that were not completed.

The challenges encountered during the attempt to complete the tasks exposed three areas, namely content presentation, information structure, and navigation. These areas focused on how the Websites communicate with the user in terms of how content is displayed, where information is located, and how the Websites guided the user from one part of the site to another.

The study also showed that there is a difference in the response on the task level versus the input provided at the end of performing all the tasks. The task level reflected the experience of the participants at the time the individual tasks were performed. The experience was either positive of negative. The overall experience of using Website allowed the participants to reflect on what transpired after all the tasks were performed. The reflection gave an insight on how satisfied the participants were in using the Website.

Chapter 1: The Problem

Introduction

Businesses have resorted to employing Web technology to either sell their products (i.e., electronic commerce or e-commerce) or to have a presence on the Internet to disseminate information—who they are, what they do, what their products and services are, who to contact, where they are located, and how to get to the physical location. Educational institutions are also using the Web to establish visibility and to offer computing services to its faculty, staff, and students. Harpel-Burke (2006) identifies three major functions of a university Web site: (a) promotion and marketing; (b) online services; and (c) provide a vehicle to communicate between individuals and groups.

It seems easy to have a Web site built and implemented. Just ask the Information Technology department to build one or have an outside company do it. However, the Web site built may have issues, such as it is not being used by the people who visit the site. These visitors briefly stay at the site and leave immediately.

Although there is widespread use of Web sites, it is possible that many Web sites are not meeting the users' expectations. These Web sites are difficult to use and are, therefore, considered not usable. The users end up confused and frustrated. For first-time site visitors, the Web site has roughly two minutes to get the user engaged (Nielsen & Loranger, 2006). The site must justify the time spent by the users on the site (Nielsen & Loranger, 2006). It is important to capture the user's interest instantly: "If a page doesn't do that immediately and clearly, they go elsewhere. Most don't even bother scrolling to see what's further down the page" (Nielsen & Loranger, 2006, p. 21).

Background

People go to the Web for a reason. They have a certain goal in mind. The goal could be finding out the latest news or weather condition in their locality, use one's Web e-mail account, shop for a new dress, manage personal finances, or to simply look for information. In almost anything we need to do, the Web can help us accomplish our goal. The Web has become an integral part of our daily activities.

Web sites, in itself, have goals, too. If the Web site caters to online shoppers, then the goal of the Web site is to sell merchandise. If the Web site is a search engine, then the goal is to provide relevant results. If the Web site is an educational institution, then the primary goal is to market and promote the programs being offered by the school or university. In a perfect world, the goal of the Web site must be equal to the goal of the user using the Web site.

We turn to the Web to help us in our decision-making process. If one is thinking about enrolling in a graduate program, this person no longer has to go to the physical location of the university campus to get information. All the person does is go to the university's Web site and search for the information. Presumably, the Web site will have the information being sought by the online visitor. And, if the information is in the Web site, there is the question of whether or not the online user will be able to find the information.

Being able to achieve the user's goal when a Web site is visited has been a major concern. There are many occasions where a user leaves the Web site without attaining his or her goal. The online shopper who is looking for a particular outfit leaves the site because it was too confusing to use. The prospective student who is interested in a

master's degree decides to go to another site because the information she was looking for was not available. When a user leaves the Web site without accomplishing her task or goal, then most likely there were usability issues encountered. This presents an opportunity lost to the stakeholders of the Web site. Instead of making a sale, the merchandise was not purchased. Another Web site made the sale. Instead of gaining a student to enroll into a particular program, the student enrolled in another school where his inquiries were answered. Another university gained a student.

It is important for a Web site to be usable. It is the determining factor whether the online users will use the Web site or not. A usable Web site equates to having satisfied users. These users are able to complete their tasks and accomplish their goals, which is the reason they visited the Web site. With satisfaction comes positive user experience. Users feel immensely pleased with the Web site because it is usable.

Statement of the Problem

Businesses and educational institutions implement Web sites to provide online services to their user community. There is concern, however, as to whether or not the Web sites are meeting the expectations of their intended audience. The users of Web sites encounter negative experience and dissatisfaction resulting in frustration and potential nonuse of the Web site. Web sites face interaction design challenges.

Purpose of the Study

The implementation of a Web site is not inexpensive. The latest Web technologies may be employed. As educational institutions integrate Web solutions to their Web sites with the thought that they are offering better service to their student population, they may

actually be doing a disservice. The purpose of the study is to explore the different facets that contribute to the usability of university Web sites.

Importance of the Study

The Web has been instrumental in people's daily activities. The Web is used for just about anything. If driving directions are needed to go from one location to another, people use their favorite Web map tool. Online users resort to the Web to obtain more information before making decisions. For example, if a prospective student wants to attend graduate school, this person visits a number of university Web sites to find out what programs are available. The prospective student attempts to gather information based on what is found in the Web site.

University Web sites have started to employ present-day technology (e.g., Web 2.0) to enhance the online experience of users. A university Web site contains a tremendous amount of information about the programs being offered. However, it is possible that a user has question or needs more information. The presence of new technologies in the Web sites is aimed at addressing the additional needs of the user. There are sites that employ a chat system, where a site visitor is able to converse with a representative of the university to ask questions in real time. Also, there are sites that use podcasts to broadcast messages and testimonials to give the prospective student a broader perspective of a particular program.

This study is significant because the following will be derived: (a) an understanding of the interaction relationship between the user and the subject Web sites; (b) a determination of what constitutes ease of use when using a university Web site; and

(c) knowledge about the impact of user experience and satisfaction when interacting with a Web product.

Research Questions

This study will have the following research questions, which revolve around how an individual interfaces with the subject Web sites. These questions were derived from cognitive and affective issues on interaction design, in particular from the perspective of performing tasks using the Web site.

1. How did the students rate the level of difficulty in completing each task? A list of the tasks to be performed by the students is in Appendix A.
2. What did the students find most helpful in completing the tasks?
3. What did the students find least helpful in completing the tasks?
4. How satisfied are the students in using the Web site?

Definition of Terms

The following is a list of terms used in this study with the corresponding definitions.

e-Commerce. The buying and selling of products or services over the Internet. (Walther & Levine, 2000).

HTML. Hyper Text Mark Language. HTML documents contain tags, which dictate their appearance and behavior (Mercer, 2003).

Human-computer interaction. Human-computer interaction is also known as HCI and its definition is, "Human computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use

and with the study of major phenomena surrounding them" (Human-Computer Interaction, 2007, p.5)

Information architecture. Morrogh (2003) gives the definition as "Information Architecture is primarily about the design of information environments and the management of an information design process" (p. 6).

Interaction design. Preece, Rogers, and Sharp (2002) define Interaction Design as "designing interactive products to support people in their everyday and working lives" (p. 6).

Internet. The Internet is the global interconnection of computers linked by telecommunications networks (Worsley, 2000).

Intranet. An environment in the organization that offers web-based applications as tools to authorized users of the company to work collaboratively (Bird & Harwood, 2005). Some of these tools are group-based scheduling systems, message boards, task lists, chat rooms, and file sharing systems.

Rich Internet application. Eichorn (2006) gives the definition of a rich Internet application:

> A Rich Internet Application (RIA) is an Internet Application that attempts to bridge the usability gap between native applications and normal Internet ones. It contains more code on the browser, which offers higher levels of interactivity and an experience similar to native applications. (pp. 4-5)

Web Application. A Web application enables a user to interact with a database by providing input through the use of a Web browser and then display back to the Web browser a dynamically generated response. An example of a Web application is when a user logs in to her bank account using a Web browser (Su &Wasserman, 2006).

Web browser. The Web browser is the tool used to access Web sites. In 1993, graphical browsers were developed. One of the first browsers was Mosaic, which was developed by Andreessen of the National Center for Supercomputing Applications (NCSA). Andreessen eventually formed a company to produce a commercial browser known as Netscape Navigator (Underdahl & Willett, 1998).

Web portal. Cooper and Reimann (2003) give the definition of Web portal, as used in the context of this study, as an environment where:

> …users can access a particular kind of information and accomplish a particular kind of work: environmental portals. Actual work is done in an environmental portal. Information is gathered from disparate sources and acted upon; various tools are brought together to accomplish a unified purpose. (p. 116)

Web site. Cooper and Reimann (2003) define a Web site as:

> sets of pages or documents organized sequentially, hierarchically, or in some other directed graph, with a navigation model to take users from one page to another, as well as a search facility to provide more goal-directed location of specific documents. (p. 481)

World Wide Web or the Web. The World Wide Web or the Web can be referred to as a service on the Internet. The service pertains to the request made by the Web browser residing on the end-user's computer (also known as the client computer) to the Web server computer and Web server's response to the client computer (Stauffer, 2002).

Limitation of the Study

A usability study is normally conducted in a usability laboratory where there are audio and video recording equipment to document the activity. Aside from the room where the tester will be seated, there is a separate room with a glass to monitor the test. This secondary room is where the recorders are located. The recorders are people who

take notes once the testing has commenced. In some cases, software that records computer activities, such as navigation and mouse clicks, is used.

This research will not use a usability laboratory, as well as any recording devices or software. A room replicating a usability laboratory but without the secondary room will be used. The researcher will be the only recorder. To avoid bias in this study, there will be testing guidelines that will be strictly adhered to. The guidelines are outlined in Chapter 3.

Summary

A Web site provides its users access to information and other Web technologies (e.g., online application, chat system, etc.). Although the Web site presents outstanding features and functionality, it is possible that the user is enduring difficulty in using the site. The user could be confused on how to navigate the different screens. The interaction between the user and the system leads to frustration and dissatisfaction, which equate to negative user experience.

Chapter 2: Review of the Literature

Evolution of Web sites

Since their inception, Web sites have evolved from a technological standpoint. Although transparent to the user, the mechanics of how a Web site works have changed from simple, static Web pages to more sophisticated information- and application-centric Web portals. Though newer Web technology is available, there are still Web sites using earlier technology. This is because the requirement for the Web site does not necessitate the implementation of the more elaborate features. On the other hand, larger organizations will use the most up-to-date technology in their Web sites in order to stay competitive and improve workplace productivity. This section will look into the progress and advancement of Web sites.

Hyper Text Markup Language (HTML)

During their early stages and before the advent of Web applications, Web sites used Web pages that were built using Hyper Text Markup Language (HTML). HTML was developed to address the need to share information among the members of the physics research community (Underdahl & Willet, 1998). In 1989, while working at the European Organization for Nuclear Research (known as CERN), Berners-Lee proposed the hypertext system (Underdahl & Willet, 1998). Following the proposal, Berners-Lee, together with Caillau, created HTML (Mercer, 2003). HTML enabled documents to be made available in the Internet through the utilization of hyperlinks to locate the documents (Underdahl & Willet, 1998). In addition, HTML documents contained tags, which dictate their appearance and behavior (Mercer, 2003). Mercer explains the goal of HTML and how it is disseminated over the Internet.

> The goal of HTML was to create a platform-independent language for constructing hypertext documents to communicate multimedia information easily over the Internet. Using an Internet protocol called Hyper Text Transport Protocol (HTTP), HTML documents could be transmitted to any user on the Internet and displayed by software called a browser. (p. 2)

HTML has undergone iterations through the years (Gosney, 2003; Willard, 2002). Gosney lists the history of HTML,

- HTML 2.0. The early standards for HTML contained many of the core features still seen in today's version of the language.
- HTML 3.2. The first W3C [World Wide Web Consortium] for HTML, this version added popular features such as support for superscript, tables, and so on. It also provided backward compatibility for HTML 2.0.
- HTML 4.0. This was an early gold standard for HTML, and it is the version, which most early HTML programmers used. However, HTML 4.01 has since superseded HTML 4.0. (p. 14)

The iterations of HTML are attributed to the absence of standards. The W3C has since issued standards for HTML and other programming languages for the Web (Willard, 2002). Using standards, HTML 4.01, through the use of Extensible Markup Language (XML), was able to craft Extensible Hyper Text Markup Language (XHTML). XHTML is instrumental in making HTML available for use in portable devices, such as cell phones and hand-held computers (Willard, 2002).

There are now many Web technologies available in creating Web pages. Basic HTML may be considered dated technology but it still has its use depending on the requirement. A simple Web page of an educator wishing to share information can be built using basic HTML. However, for a corporate Web site whose requirements range from handling inventory to sales data, it is necessary to use a more sophisticated tool (Gosney, 2003).

Web Application

It is possible that within a Web site there is an embedded Web application. Baxley (2002) defines a Web application as "a specific type of Web site that implicitly and explicitly stores data unique to each of its users. Put more succinctly, a Web application is software on the Web" (p. 2). A Web application is not to be confused with content-based Web sites, such as Cable News Network or The Washington Post (Baxley, 2002). On the other hand, online retail stores are Web sites that use Web applications to conduct business. For the online buyer to be able to purchase merchandise, the Web application needs to identify the buyer through the use of a username and password. After authentication, the online user can complete the transaction by confirming the purchase of the selected merchandise and providing the shipping and payment information. This activity is a one-on-one interaction between the online shopper and the Web application (Baxley, 2002). No salesperson is involved in the transaction.

Aside from online retail stores, there are many Web sites, which offer goods and services through the use of Web applications. Some sites allow its users to purchase and sell their investment portfolio. There are sites that offer vacation packages—airline and hotel bookings, as well as car rental reservations (Baxley, 2002). Other organizations, such as the utility companies (i.e., water, electricity, and gas), make use of Web applications to enable their customers to view account balances and pay their bills. Through the use of Web applications, companies offer convenience to their users.

There are advantages in using a Web application. First, since a Web application utilizes a database, there is complexity in handling and displaying current data. Corporations are able to share pertinent data with other field offices through the use of a

Web application (Baxley, 2002). Second, there is no installation required on computers to run Web applications. The programmers are spared from dealing with isolated conflicts between the software and the hardware. To use the Web application, the user simply goes to the designated Web site (Baxley, 2002). Third, users can use the Web application wherever they are as long as there is a computer with Internet connection. If a person has a Web mail account, this person can access the e-mail account from any location (Baxley, 2002).

Whenever there are advantages, there are disadvantages. Although Web applications have the functionality and features of desktop applications, there are limitations. To use a Web application, the computer must be connected to the Internet. No Internet connection, no Web application (Baxley, 2002). Another disadvantage is that not all users have access to high-speed broadband connection. The programmers must be mindful of this. Images and multimedia content may take a longer time to paint the browser's screen due to a slow connection (Baxley, 2002). Next, several factors may impact how the Web application is presented on the screen. Some contributing factors are: the resolution of the monitor, user settings, and which browser is used. The designer must take these factors into consideration when designing the application (Baxley, 2002).

Before Web technology, business applications were built using traditional client/server development tools, such as Visual Basic and PowerBuilder. The finished product needed to be installed on the computer (the client), which would be used by the user. The other components of the product were installed on the server. If the computer did not have the installed product, the user of that particular computer would not be able to use the application. Oftentimes, there were software- and hardware-compatibility

issues encountered during installation. These conflicts had to be resolved before the application could be used. With Web applications, on the other hand, there are no requirements to install software and other components on the computer. Thus, Web applications hardly encounter compatibility issues. The only software required to run a Web application is the Web browser, which comes as a standard load on computers. The most evident advantage of Web applications is their ability to be used from any computer with Internet access. As other benefits of Web applications emerged, there was acceptance of this new breed of applications from both the programmer and end user communities.

Web Portal

For Strauss (2002), Web portals are not just a novelty that is here today and gone tomorrow nor is it a fancy name for an old product or process to which we are accustomed. Portals will revolutionize how Web sites for universities and corporations are built. Referring to portals, Strauss (2002) continues,

> They will turn the Web from an institution-centric repository of information and applications to a dynamic user-centric collection of everything useful to a particular person in a particular role. Instead of a single home page that proclaims identically to all who visit how grand the institution is, portals will give nearly every user a customized, personalizable, unique Web page. (p. 33)

The World Wide Web has a lot of Web sites offering free portal features to online users. A couple of examples are Yahoo's My Yahoo and Excite's My Excite. These sites use the word "My" to inform the user that the site is a portal. On the other hand, there are sites that use the word "portal" on their home page to denote a portal site, but all these sites do is offer links to other Web sites and search engines. The use of the words "My" and "portal" in the site's main page does not make the Web site a portal (Strauss, 2002).

There are two types of portals. One is called the Horizontal Enterprise Portal (HEP), referred to as megaportals. The other type is known as the Vertical Enterprise Portal (VEP; Strauss, 2002). The goal of an HEP is to provide its public users an array of services that they possibly need (Strauss, 2002). Strauss gives an example of services, "All HEPs include shopping, weather, stock prices, news, search engines, chat groups, horoscopes, and so forth, and they all urge you to make their page the first page you see when you use the Web" (p. 35). HEPs enable their users to customize and personalize the main page. Personal settings such as the weather condition in the city where the user lives can be set, as well as, monitoring one's favorite stock portfolio (Strauss, 2002). Although personal settings offer convenience, Strauss cautions while these personal settings are normally set on the computer that is regularly used, it is possible that these settings will not be available on another computer. The reason behind this is because the portal uses an electronic file called Web cookies, which are stored locally in the computer. Another characteristic of a horizontal portal is its inability to offer data particular to an organization. According to Strauss,

> Horizontal portals have no way of offering that kind of organization-specific information because they are not connected to any organization's data sources except their own. Only your own organization or organizations can really deliver access to all the Web information you need, and even then, much of the information you need will be outside your university, such as your very own TIAA/CREF [Teachers Insurance and Annuity Association/College Retirement Equities Fund] or other retirement plan information. (pp. 35-36)

The other type of portal has a different purpose. As defined by Strauss (2002), "A VEP is a portal that delivers organization-specific information in a user-centric way" (p. 36). User authentication is required to get into a VEP. The username and password are provided in the login screen. Through the authentication process, the portal is able to

identify the user and grant the appropriate security access rights. Unlike HEP, a VEP can hold information about its organization. The portal knows if the user is a student, a faculty member, or staff. The VEP can further drill down and determine other pertinent details about the user. The portal identifies the department to which the user belongs and, if the user is a faculty member or if a student, the portal knows in what program the student is enrolled. A university staff can view personal information, like vacation and sick leave balances. VEPs also give its users the flexibility to personalize the main page after logging in. This is possible because of the availability of information in this type of portal (Strauss, 2002).

There are many reasons why a university will require a Web portal. A portal could be instrumental to increased productivity or improved operations. The success of the portal depends on how the university's community recognizes the benefits (Daigle & Cuocco, 2002). The positive effect of implementing a portal is that, "The portal should make it easier and more efficient for every stakeholder to carry out his or her role in the institution" (Daigle & Cuocco, p. 113). The benefits of VEPs, according to Daigle and Cuocco are:

Students benefit from

- Web interface with courseware and required information about courses
- Increased and easier communications with faculty members
- On-line access to grades, financial aid information, class schedules, and graduation checks
- Access to the communities of interest within the university, such as sports, clubs, and community service opportunities
- Increased lifelong learning opportunities

Faculty and staff benefit from

- Real-time communications with students
- Simplified course management tools
- Instant access to information for advising students

- Easily accessible information for every facet of their job. (p. 114)

Portals are implemented with the expectation that the user community will use the technology. Institutions invest in personnel, money, and other resources for such a deployment. Therefore, there is an expected return on investment (ROI). The organization is anticipating its users to make full use of the portal. However, there is the possibility that the users will not adapt to the utilization of the portal. Also, in some cases, the users may opt to continue with their current methodology of performing their tasks and getting things done. When this happens, the ROI is not attained. Because the users continue to use the old system or systems, which were supposed to be replaced by the portal, there are now multiple systems being maintained (Sullivan, 2004).

There are likely causes as to why users do not adapt to the use of portals. One reason is having difficulty in using the portal. A site's ease of use is a major concern when creating a product. In order to produce a usable product, there needs to be a conscious effort in understanding how users use a site and perform their tasks. If the portal does not meet the users' expectations, the portal will not be used (Sullivan, 2004). User and task analysis is a good technique to determine how users use a Web portal.

A second reason why users would not readily adapt to the use of the portal is the perception on questionable content integrity. The portal may be advertised as having any document for which the knowledge worker could ask. The existence of such documents remains to be seen. The user could be looking for a particular document, such as a full market study, but ends up with a different type of document. The user does not want this kind of outcome from his search. The adage "Build it and they will come" is not a viable strategy for portals (Sullivan, 2004). There is a requirement to obtain helpful details, "We

need to know what kind of information the knowledge workers want, where it is located, and how to capture it" (Sullivan, 2004, p. 73).

A third reason is resisting organizational change. A major change on how business activities are conducted in an organization, at times, is met with resistance. When people are used to doing things in a certain way, they do not accept change gracefully (Sullivan, 2004). There are ways to counter resistance. In most cases, upper management is able to help. An executive can order the retirement of the client/server version of an application because the functionality of this system is now available on the portal. The use of the portal now becomes imperative. An example of a client/server application, which has a Web portal counterpart, is e-mail (Sullivan, 2004).

Another way to address resistance and gain acceptance with the user community is to provide access to valuable information. An example is to offer the capability to view and manage the user's retirement plan (401K; Sullivan, 2004). A different approach to achieve acceptance is to offer a service, which is only available to the portal. An invaluable service is a powerful search engine that can find documents not only in the portal repository but also in other places in the network, such as file share drives and folders of public e-mail (Sullivan, 2004).

A phased implementation on who uses the portal first is a good strategy for adaptation. An effective approach is to start with users whose computing needs are met by the portal. Once these users adapt to the portal, engage another user community in the organization to use the portal. Then, repeat the process until every type of user is on board (Sullivan, 2004).

Web 2.0

There is a new breed of Web sites. These Web sites involve online participation and collaboration (Smith, Baker, & Montes, 2008). The Web sites are said to use Web 2.0 technologies, such as scripting (e.g., JavaScript) and CSS [Cascading Style Sheets] (Gibson, 2007). Web 2.0 is considered the new Web because it offers new services to its users. Some services are "blogs, wikis, multimedia sharing services, content syndication, podcasting, and content tagging services" (Smith et al., 2008, p. 1). Web 2.0 was first mentioned during the O'Reilly Media conference in 2004 (Gibson, 2007; Smith et al., 2008).

Web 2.0 has contributed to the improvement of user interfaces and how users interact with Web applications (Smith et al., 2008). According to Smith et al., "…a relative novice can put together a simple user interface to popular applications" (p. 1). With Web 2.0, it is possible to unite data coming from multiple sources into one integrated service. If there are new data from any of the sources, the application will be able to display the new information whenever it is available (Smith, et al., 2008). This type of Web site behavior is one of the major categories of Web 2.0 known as interactivity. The other categories are social networking, tagging, and web services (Treese, 2006).

The example above has given rise to what is called the Rich Internet Application (RIA). RIA is still a Web application. However, RIAs present a different way about how users interact with Web applications (Eichorn, 2006). The user interaction and experience with an RIA is similar to using a desktop application such as a word processor or spreadsheet (Eichorn, 2006; Thau, 2006).

On a Web site that does not utilize RIA to display new information on the Web application's Web page, there is the noticeable switching from one screen to another, known as page reloading. Eichorn (2006) points out that with RIAs, there is a new way to display information. The Web page does not need to reload to refresh the information on the browser. The updated information is put on view instantaneously. The reloading of the Web page can take from one second to several seconds. In the Internet world, a few seconds is a long time to wait for new information to be displayed on the screen. For interactive Web sites that employ RIA, the response time is improved (Thau, 2006). The RIA's immediate display of updated information (Eichorn, 2006) equates to a positive user experience.

Another example of Web 2.0 interactivity is Google Maps. The map can search for a location, display the map and put a marker on the location. The user can zoom in and zoom out of the map (Thau, 2006). Also, the user is able to slide the map to show parts that were not initially visible on the screen. When this happens, there is normally no wait time. The hidden parts of the map are immediately displayed (Treese, 2006).

Social networking is the second main category of Web 2.0. Social networking is not a technology but it uses the Web to connect social groups. Social networking can be thought of as nodes interconnected to each other (Treese, 2006). You will be the central node. The nodes connected to you will be your family, friends and peers (Treese, 2006). Expanding this model, the other nodes would attach their family, friends, and peers. There is social networking software that harnesses this information and becomes useful in a number of ways. For example, suppose you want to work for a particular company. The social networking software will be able to determine if you know someone who in

turn knows someone who is employed in that company (Treese, 2006). Friendster and LinkedIn are two early social networking systems. There are now other systems available, such as FaceBook and Multiply.

Tagging is the third major category of Web 2.0. Tagging, like interactivity and social networking, is a simple concept. The idea is to label data objects with tags (Treese, 2006). A few examples of data objects are e-mail, photo and Web site. When searching for an e-mail or photo, the tag is used to search for the data object. The use of tags becomes the method of organizing the objects compared to using the more common directory tree structure of folders (Treese, 2006).

To illustrate how tags work, let us look at Flickr, which is a photo Web site. Flickr allows users to tag their own pictures, as well as the pictures of other users. The outcome is a database full of searchable pictures (Treese, 2006).

Web site bookmarks can also be tagged (Treese, 2006). People in the academic arena are able to make use of social bookmarking. It was determined that lecturers use the Web to search for materials they will use (Ullrich et al., 2008). The materials, once found, are bookmarked. These bookmarks, however, are only available locally on the computer that was used for the search. So, when the lecturer wants to show the bookmarked materials using a different computer, the bookmarks are not available. By using a social bookmarking service, the Web site bookmarks are accessible from any computer (Ullrich et al., 2008).

The fourth main category of Web 2.0 is Web services. Web services pertain to computer programs using the Web, which is different from the usual manner of displaying Web pages via the Web browser (Treese, 2006). A characteristic of Web

services is that a Web site becomes more valuable because there are more users utilizing it (Ullrich et al., 2008). This scenario is not to be confused with a high-traffic (i.e., a lot of visitors) Web site that does not use Web 2.0 and only displays static content (Ullrich et al., 2008). With a Web site that uses Web services, people are able to contribute information explicitly and implicitly (Ullrich et al., 2008).

When people go to the online encyclopedia site, Wikipedia, the users are able to modify the site's content. The users are empowered by the site to make changes, like delete or add information (Ullrich et al., 2008). This is what is meant by contributing information explicitly. When an online shopper is browsing a particular product at amazon.com, the shopper is assisted in making a decision by informing the shopper that there were customers who bought the merchandise together with related items. The Web site, amazon.com, is able to harness information through collaborative filtering based on what previous customers bought and make a suggestion to the prospective buyer. This is an example of contributing information implicitly (Ullrich et al., 2008).

Summary of Evolution of Web Sites

The first generation Web sites employed simple, static Web pages. HTML was used to command the display and behavior of the pages. Its initial purpose was to locate documents being used by a physics laboratory in Geneva. HTML is considered dated technology but it still has its uses. Web sites, which only require linking of pages to share information, use HTML. On the other hand, the development of newer Web technologies resulted in the advent of Web applications. Web application has been coined as software on the Web due to its nature of performing in a similar fashion as a native desktop application through the use of Web technology. With Web applications consumers are

able to conduct online shopping. In addition, business entities are able to perform tasks, such as run reports and generate sales forecasts, with Web applications. From Web applications, Web portals came into existence. Web portals grant users access to information and applications associated to their role in the organization. If a student signs on, the portal will allow the student to view personal and schools records, as well as perform activities, such as enrollment and adding and dropping of courses.

Web 2.0 offers a new way of using Web sites. Web 2.0 is said to be the next generation of the Web. With Web 2.0, online users are able to use interactive applications, like Google Maps; engage in social networking Web sites, like FaceBook; and tag documents for easier organization and searching of data objects, such as photos, e-mails, and Web site bookmarks. Web 2.0 also harnesses information supplied by users, either explicitly or implicitly.

Understanding the Interaction Between User and Computer Software

The second section deals with how users use software technology to perform tasks. It is often thought that the intended users will use a well-written, error-free application because it was particularly made for them. However, this assumption is not always true. Users often encounter confusion and difficulty when they use the computer software. There exists a gap between the users and technology. This section will look into the various factors that aid in decreasing this gap.

Software Development

We use a computer and computer software (also referred to as software or application) on a regular basis. In the workplace, one of the first things we do when we get to our desk is turn on the computer. Afterwards, we start using computer software,

such as a word processor or spreadsheet, to do our tasks. In some cases, a Web-based software is used. Computer software has increased productivity because many of the manual tasks have become automated. By using a computer application, there exists a one-on-one interaction between the user and the software. The quality of interaction experienced by the user is dependent on how usable the software is. Therefore, even though the software is used, there exists the possibility that the users are dissatisfied.

As programmers develop software, their main thrust has been to design the programming code to work properly, without any errors. The design on how users will interact with the system only comes as a result of how the code was written (Cooper, 1999). The effect is that, "They design what it does but not how it behaves, communicates, or informs" (Cooper, p. 16). As a result, when the programmers reflect on their creation, they only see the abundance of functionality of the product but not the shortcomings (Cooper). Cooper adds, "They ignore how excruciatingly difficult it is to use, how many mind-numbing hours it takes to learn, or how it diminishes and degrades the people who must use it in their everyday lives" (p. 15).

Software development has adapted to the demands of changing times and has recognized the importance of design in fulfilling the users' requirements. Cooper and Reimann (2003) discuss the progress of software development and show where design participates in an active role. During the infancy of software development, programmers did all the work. When useful software is envisioned, programmers wrote the code and performed their own testing. However, as software became widely used by different facets of the organization, complexities in developing software abounded. To bring order to software development, product managers defined the requirements due to their

knowledge in the market condition and competition. In many cases, the product requirements were a description of features the users wanted. As the product went into production, there were features that were not implemented due to schedule constraints.

The advancement in the software industry yielded to testing as its own discipline. As a result, testing became a separate stage in the development process. Also during this period, usability and design were introduced in the development cycle but only in the latter part and mostly to address aesthetic presentation. Now, the process has been much improved using an iterative method, which is a cyclical approach on development. Design and coding are performed at the same time. The software is tested for bugs while users tested the software. The errors are fixed by going back to the design and coding stages (Cooper & Reimann, 2003).

Finally, a software development undertaking that is guided by defining who the users are and what their goals are is referred to as a goal-directed method. It is the designer's responsibility to define the users and their goals. Therefore, it is imperative that programming be preceded by design (Cooper & Reimann, 2003).

Human-Computer Interaction

Software, before being released to its intended users, undergoes a battery of tests to make sure there are no bugs and any application errors. However, the true test of the software is when the end-user uses it. There are situations where the end-user does not understand or gets confused on how to operate the software. Preece et al. (1994) give an example from Lee (1992). An airplane crashed in 1990 and killed 98 people. An industry magazine reported that there was inadequate perception between the pilot and the device. It was noted that it was the responsibility of the aircraft manufacturer to address this. The

airplane builder acknowledged the existence of the problem. However, instead of recognizing the importance of computer programs to work harmoniously with the end-user, the claim was the pilot failed to familiarize himself with the computerization. There are many other examples of software not being able to meet the needs and expectations of the user. To address the software issues, the field of human-computer interaction (HCI) assists in bridging the gap between the software and its users.

HCI evolved after the introduction of the first electronic computers in the 1950s and 1960s, although it was not a field of study at the time. The computers in this era were very expensive and had to be operated by trained personnel, known as experts (McCracken & Wolfe, 2004). Preece et al. (1994) point out that the technical experts, who were either scientists or engineers, were well versed with the complexities of programming. According to McCracken and Wolfe, "Little thought was given to the idea of making life easier for people using the programs" (p. 3). In the 1970s and 1980s, there was a dramatic change on how computers were used. The computers reduced in size and became inexpensive. International Business Machines (IBM) introduced the IBM Personal Computer to the market in 1981. This computer was designed for use in home and small businesses. The presence of personal computers (PCs) created a new breed of users. These new users are non-experts. They are computer users who work in different fields for a living. They have expertise in other areas, like business or medicine. The non-experts are not interested on how the personal computer works. For them, the PC is a device, such as a telephone, to help them in their work and daily life (McCracken & Wolfe, 2004). In addition, the first PCs were considered a breakthrough in terms of

providing an interactive system to end-users at a comparatively inexpensive price (Preece et al., 1994).

The changes in computer technology opened up opportunities for businesses. Banks, with their high-volume activities, were able to take advantage of what computers had to offer. More businesses (e.g., airline industry and retailers) made use of computers as technology improved through faster response times in handling real-time transactions. Preece et al. (1994) indicated that software companies saw the business prospect on revising the user interface to gain market share. There were improvements made by cleaning up the interface and creating visually appealing screens. The makeover supposedly made the system user-friendly. It turned out this was only a marketing strategy. Although the screens improved from the previous version, the systems still failed to address the users' needs.

On the other hand, the researchers in the academic sector had a different view on the challenges of computer technology. Their focus was on the possibility of enhancing people's daily activities through the utilization of computers. The effort centered on what users can and cannot do when interacting with the computer. This meant looking at the human side during the interactivity with the system. A new field of study developed. This field was later called human-computer interaction or HCI in the 1980s. HCI not only encompasses interface design, but all the facets pertaining to the user's interaction with the computer (Preece et al., 1994). Whenever human-computer interaction is discussed, the user is not just the single user of a computer nor is it a select group of people working on a project. User refers to anyone who uses the technology to accomplish a goal or task. Also, the term "computer" is not limited to personal computers and sophisticated, robust

computers (Dix, Finlay, Abowd, & Beale, 2004). Computer also includes "a process control system or an embedded system" (Dix et al., 2004, p. 4). A system can include non-computer related components, like people (Dix et al., 2004). Dix et al. explain interaction,

> By interaction we mean any communication between a user and computer, be it direct or indirect. Direct interaction involves a dialog with feedback and control throughout performance of the task. Indirect interaction may involve batch processing or intelligent sensors controlling the environment. The important thing is that the user is interacting with the computer in order to accomplish something. (p. 4)

HCI is a complicated field of study. It is a multi-disciplinary subject (Chen, 2001; Dix et al., 2004) and covers the following: information technology, computer science, psychology, library science, education, business and management, human factors, industrial engineering and ergonomics (Chen, 2001). Dix et al. (2004) point out that there is no one theory supporting HCI. However, they claim one fundamental principle, which is, computers are used by people to complete tasks. With this, there are three areas of concerns, namely: the users, computers, and activities being worked (Dix et al., 2004). In addition, "The system must support the user's task, which gives us a fourth focus, usability. If the system forces the user to adopt an unacceptable mode of work then it is not usable" (Dix et al., 2004, p. 5).

Interaction Design

The following is a brief history of interaction design. It starts with the simple use of the computing hardware. Then, the interactive design starts to get complex due to emerging technologies and the awareness of the different needs of users. As interaction design matured, it was determined that to produce a well-designed product, professionals coming from different disciplines need to work as a team.

The method of operating the first computers in the 1950s and 1960s was very different compared to how current computers are utilized. Years ago, computer hardware was operated using switches and dials. These machines were used and designed by engineers, who were considered a highly skilled group of individuals. When the personal computers (PCs) emerged together with the computer monitor, there was a shift on who uses computers and how these users interact with the device. The new users were ordinary people, not engineers, who wanted to use the computer to perform tasks entailing human cognition, such as typing documents and performing calculations. In order for the new type of users to execute their tasks, an interface was needed. However, it was not easy to design an interface. Computer scientists and psychologists had to work together. On the programming side, computer scientists collaborated with software engineers (Preece et al., 2002). Grudin (as cited in Preece et al.) added that the joint effort of people from the different fields contributed to the advent of interface design.

The effort on creating products for simple visuals and interactive keyboards did not stop. There were new hurdles. There was the development of the graphical user interface (GUI), which greatly contributed to work-related systems. With GUI came other things with which we are now familiar. Some examples are Windows, menus, and icons. Extensive research and design are required to present these elements on the computer screen. The mid-1980s presented a new set of technologies (e.g., voice recognition, virtual reality, and multimedia) in the computing world. There were more applications that needed to be designed for a growing audience. Interactive learning and educational systems and training simulators evolved requiring a different group of experts (e.g.,

educational technologists, developmental psychologists, and training experts; Preece et al., 2002).

In the 1990s, networking, mobile computing, and infrared sensing came as new technologies. New and varied applications abounded to serve a wider audience. The use of computing technologies has expanded from work to school to home. Computers were being used everywhere and this commanded a different way of living. The design and integration of these new technologies were seen as opportunities (Preece et al., 2002). The mid-1990s brought more professionals into the multidisciplinary field of interaction design. There were sociologists, anthropologists, and dramaturgists with each one having a different view on human interaction when compared to psychologists. The new interactive systems require a different approach. For example, if the application being developed is an interactive story material for children, then, the designer needs to understand how children write and comprehend narrative (Preece et al., 2002). Using this approach, the designer is able to devise a product that is suited, in terms of usability through interaction design, for its audience.

In the 2000s, new hardware in the form of radio-frequency tags, interactive screens, and information appliances were introduced. These technologies are not necessarily used as stand-alone units. They are integrated with other electronic components to optimize their use. The engineers must ensure that these devices interact and communicate well with each other to be effective (Preece et al., 2002).

There are ways to achieve excellent interaction design. Cooper and Reimann's (2003) formula is, "Design that meets the goals and needs of users (without sacrificing business goals or ignoring technical constraints) is one measure of design superiority" (p.

91). Underneath an outstanding interaction design are principles (e.g., conceptual-level, interaction-level, and interface-level), which serve as guidelines (Cooper & Reimann, 2003).

> They represent characteristics of product behavior that help users better accomplish their goals and feel competent and confident while doing so. Principles are applied throughout the design process, helping us to translate tasks that arise out of scenario iterations into formalized structures and behaviors in the interface. (Cooper & Reimann, 2003, p. 91)

Principles are not to be confused with style guides. Style guides are on the detailed level of the appearance of the interface. The style guides are based on corporate branding and guidelines of usability. Some examples of style guides are font face, font size, and behavior of buttons (Cooper & Reimann, 2003). Cooper and Reimann encourage the use of style guides where applicable. However, to address the bigger issues of product behavior, which are not covered by style guides, the use of interaction design principles is strongly suggested (Cooper & Reimann, 2003).

User-Centered Design

Rubin (1994) points out that user-centered design (UCD) is not new. It is a new terminology for something that has existed for quite some time, decades, actually. The older names of UCD are human factors engineering, ergonomics, and in recent times, usability engineering. Human factors engineering is more popularly used in the United States, while ergonomics is vastly used in European countries (Rubin, 1994). Rubin claims that the Human Factors Society is now called The Human Factors and Ergonomics Society. Rubin adds, “UCD represents not only the technologies, processes, methods, and procedures for designing usable products and systems, but just as important, the philosophy that places the user at the center of the process” (p. 10).

In 1985, Gould and Lewis described the "three principles of system design which we believe must be followed to produce a useful and easy to use computer system" (p. 300). Rubin (1994) referred to the work of Gould and Lewis as human-oriented system design and mentioned Gould and Lewis' principles as the three principles of a user-centered design. The first principle deals with early focus on users and tasks. It is necessary to understand who will use the system (Gould & Lewis, 1985). Gould and Lewis explain, "The understanding is arrived at part by directly studying their cognitive, behavioral, anthropometric, and attitudinal characteristics, and in part by studying the nature of the work expected to be accomplished" (p. 300).

The second principle is about empirical measurement. The target users should be involved in the development process. The users will provide valuable input in every stage of the development lifecycle. In addition, the use of prototypes to observe the users' impressions is helpful in documenting the process and the users' experience (Gould & Lewis, 1985).

The third principle involves iterative design. If problems are encountered during user testing, the problems must be addressed. It may be necessary to redesign. A cyclical pattern will arise between designing, testing, and measuring until satisfactory results are obtained (Gould & Lewis, 1985).

User Experience

User experience is the quality of interaction between the user and the product being used. The experience pertains to how the product works from the outside, not from the inside. An example of user experience is working with the buttons and knobs of an alarm clock. The user is not interested on what goes on in the components of the alarm

clock but how the alarm clock will be useful and how easy it is to set the alarm (Garrett, 2003).

User experience is present in every product we interact with including Web sites. Garrett (2003) states, “In virtually every case, a Web site is a ‘self-service’ product” (p. 11). Each site presents a unique experience. Some Web sites may be easier to navigate; some sites take a little more effort to find what you are trying to locate. The user is left in front of the monitor to deal with the Web site without an instruction sheet or a user manual. The user relies on previous experience to lead her in using a Web site (Garrett, 2003). Garrett adds, “Despite the vital strategic importance of user experience to the success of a Web site, the simple matter of understanding what people want and need has been a low priority for most of the history of the Web” (p. 11).

According to Cooper and Reimann (2003), the experience of the user cannot be designed. However, it is the means of interaction that can be designed. This is because the user’s experience can only take place after the person has interacted with the artifact or system (Cooper & Reimann, 2003). The user’s experience is perceived to be enhanced when there are a lot of features (e.g., multimedia and graphics) in the Web site. However, many times, the added features contribute to difficulty in using the Web site. Because the Web site is complicated to use, the users, especially first-time users, get discouraged due to the negative experience. Businesses have realized that providing excellent user experience is important. It is the determining factor whether the user will return to the site or not (Dustin, Rashka, & McDiarmid, 2002; Garrett, 2003).

Summary of Understanding the Interaction between User and Computer Software

When software, like a Web site, is developed, the concentration has been on designing the code to work without errors. With this approach, the design on how users will use the application becomes unintentional. The end result is having an inadequate product, which is complicated to use, takes extra time to be skilled at, or demeans the person who uses it on a regular basis.

Human-computer interaction (HCI) is all about the interaction between the user and the computer. A concern of this study, in particular, is the interaction with a Web product, a Web site. A Web site brings sophistication in conducting everyday activities. Employees are able to perform their work through the use of the company's Web site. Students can register and enroll by going to the university's site. Professors can conduct collaborative work with their students by through the use of the educational institution's Web site.

Although a Web site offers many uses, it may not be that popular with its target user community due to usability problems. It was mentioned that if the user has to adapt to unacceptable features of the system, then, it is not usable. HCI can help in making computer systems usable. HCI deals with what users can and cannot do during interactivity with the computer. A critical aspect in HCI, to determine usability, is testing. It is through testing that the designer becomes aware that the product is not usable.

The users of the Web are different from the users of the traditional applications, which were built prior to Web technology. Web users do not get training. They rely on previous experience with other Web sites and the way they perceive how the Web site works. It is, therefore, very important that the Web site matches the users' expectations.

Through interaction design, the behavior of systems can be designed to meet the needs and requirements of the user community. Interaction design helps in delivering a useful product.

User-centered design focuses on understanding the users and the users' tasks. It is through knowing what the users do that systems are designed properly. The success of a Web site depends on whether or not it is being used. It is important to note that the input of users during design and testing brings valuable information on how a system should work.

User experience is all about the quality of interaction between the user and the product being used. The experience centers on how the product works from the outside not from the inside. User experience is not concerned about how stable the programming code is written where there are no application errors encountered when the system is used. User experience centers on the satisfaction a user gets when using the system. It is important to provide excellent user experience. It is a contributing factor to whether a second visit to the site will be made.

Conceptual Design

The section looks into the various elements, from a user's standpoint that influence the design of a software product, such as a Web site. The section will discuss how a user perceives a product based on her internal perception of how things work and the message being communicated by the product. It is important to note that the product being designed is for the end user and not for the creator of the product. Therefore, it is crucial to identify and understand who the users will be, what their goals are, and how they perform their tasks.

Conceptual Models

According to Norman (2004), in his earlier work *The Design of Everyday Things,* (Norman, 2002), there are three conceptual models vital to design. The first is the model or mental image created in the mind of the designer, referred to as the designer's model (Norman, 2004). This model is how things are according to the world of the designer.

The next model is generated when the user using the product forms a mental image based on the interpretation of how it works and this image is called the user's model (Norman, 2004). The user's model is also brought about by the user's prior knowledge and exposure to the work she regularly performs. When a product is being designed or redesigned, the mental models shared by the users contribute to generating metaphors, which are used in designing a product to which users will be able to easily relate (Hackos & Redish, 1998).

The third model is called the system image, which is the image projected by the product to the user. As people interact with the product, mental models are created based on their observation through the product's appearance, how it works, and the feedback it imparts (Norman, 2004). The following is an example of how the trashcan metaphor incorrectly communicated its use when applied to a different feature in the computer. When Macintosh used the trashcan to enable users to delete files, the users did not have a problem associating the task of deleting items in the computer because the trashcan symbolized discarding of unwanted objects. If the user wanted to dispose of an item, it was a simple drag to the trashcan. Since this concept worked flawlessly, there was another feature added to the trashcan. In order to eject a floppy disk, the user had to drag the floppy disk icon on the desktop to the trashcan. Many users did not want to perform

this activity because in their minds, that is, their mental model, a trashcan is used to discard unwanted things. The users did not want to throw away saved data in the floppy disk. Although the computer would not delete the files in the floppy disk, the users refrained from using the trashcan metaphor because in their minds, trashcans are used for disposing unneeded items. The designer, then, had to address this issue (Hackos & Redish, 1998).

In a perfect setting, the designer's model should be the same as the user's model. In this kind of situation, the user would not have any problem using the product. However, this is not the case. There is no communication between the designer and the end users (Norman, 2004). The only communication that takes place is with the system image, which is when the end user interacts with the product (Norman 2004). The product, as a result, does not match with what the user has in mind (Norman, 2002).

Figure 1 below shows Norman's (2004) conceptual models—designer's model, system image, and user's model. If the designer's model does not equal the user's model, the user will have a poor understanding of how the product works (system image) and thus the user will not use it correctly (Norman, 2004).

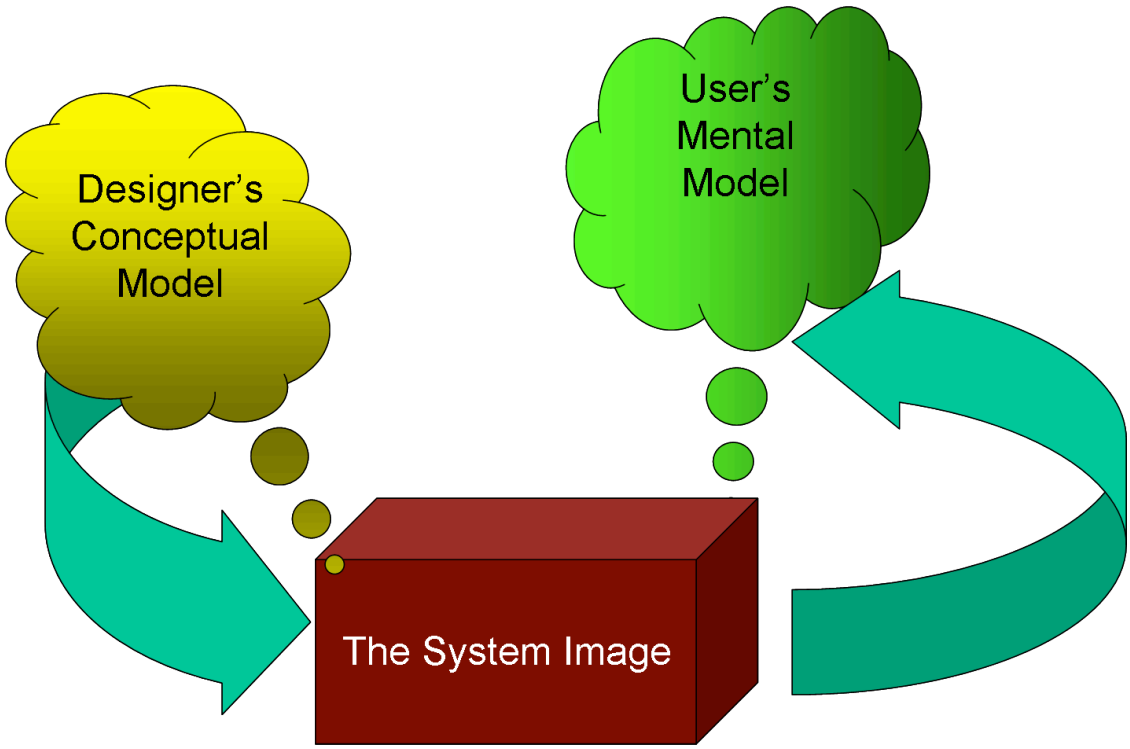

Figure 1. Conceptual models

Note. From *User Centered Design* by Norman and Draper (as cited in *Emotional Design: Why We Love [or Hate] Everyday Things*, p. 76) by D. A. Norman, 2004, New York: Basic Books. Copyright 2004 by D. A. Norman. Reprinted with permission.

User Analysis

Cooper and Reimann (2003) share what they consider a strong tool in interaction design. This tool is a model of the user with accurate and useful data on what the user desires to achieve and the rationale behind it. The user model is also known as persona. Persona is the representation of the actual user's actions and incentives in the process of design (Cooper & Reimann, 2003). Brown (2006) elaborates on the use of personas, "Any project can have one or more personas, each representing a different kind of audience for the system. Also known as: user profiles, user role definitions, audience

profiles" (p. 15). There are other tools available to the designers. However, Cooper and Reimann consider persona the best tool for the job.

Persona was originally used in marketing. The marketing people wanted to find out what type of communication would appeal to their customers. Personas are the end product of research about its intended audience. As persona provides important factual data on the customers, the designers, later on, used the information to determine the goals of the users, the different situations or events, and the list of activities performed (Brown, 2006). Appendix B shows a detailed persona of a bank's new online customer.

The terms customers and users have been used interchangeably (Baxley, 2002). However, Baxley points out that customers and users are not the same; each represents its own group:

> Customers, the focus of Marketing and Sales, are the people and organizations that give you money in exchange for goods or services. By contrast, users are the people who actually consume and interact with the goods and services. For some products, such as clothing, the customer and the user are typically the same person. For other products, however, they are not. (para. 5)

Baxley (2002) gives an example where customers are not the users. In the 401K retirement plan, the representative of the company contracting a plan provider is the customer. This person seeks for the administration features of the system. The user, in this case, is any employee qualified to participate in the retirement plan. The user's needs are different from the customer. The user seeks for the available types of investments, competent customer support, and acceptable fees. Clearly, it is imperative to identify the different personas that will be using the system. In the 401K retirement plan example, both the customer and user work for the same company but their tasks and goals are different when using the system.

Task Analysis

Task analysis looks into the duties performed by the users (Brinck, Gergle, & Wood, 2002; McCracken & Wolfe, 2004). Task analysis answers the what, why, and how of the tasks to be undertaken (Hackos & Redish, 1998; McCracken & Wolfe, 2004). Once the information is available, the design decisions can be made (McCracken & Wolfe, 2004).

McCracken and Wolfe (2004) identify three elements of task analysis, namely: goals, tasks, and actions. A goal is the desired activity to be completed by the user and is the initiating factor on why a Web site is visited (McCracken & Wolfe, 2004). As organizations use Web sites, many of these sites are technologically sophisticated and employ Web applications to offer a convenient way of achieving work-related and personal goals. Some examples of goals are checking a customer's order, purchasing merchandise, and booking a flight for a vacation (McCracken & Wolfe, 2004).

The second element is tasks. McCracken and Wolfe (2004) differentiate tasks from goals, "Tasks are mechanism people use to accomplish goals. Unlike goals, tasks could change, being technology dependent" (p. 44). If the goal is to furnish a co-worker who works in a different office location with a copy of a document, there are at least two ways to get this done. One is to send the document using a courier. Another method is to send the document as an e-mail attachment (McCracken & Wolfe, 2004). In the given example, it is clear that the goal remained the same while there were two options available in executing the tasks to attain the goal. It is, therefore, essential to understand the goals of the users. Hackos and Redish (1998) point out, "If you don't understand the

users' goals, you may well design a product with simple procedures that users have no interest in using" (p. 53).

The third element, actions, is the set of detailed activities in carrying out the tasks. Actions are the necessary steps to be performed to ensure the tasks get done. Actions are subsets of tasks (McCracken & Wolfe, 2004).

According to Hackos and Redish (1998), the ideal scenario is for the employer's goals to match the employee's goals. However, this is not always the case. Most often, a product is designed to meet the business entity's goals. As an example, a company uses a computerized, timekeeping system, where the employee's hours worked and work activities are tracked. The goal of the system is to keep an accurate recording of time worked and tasks performed for audit purposes. From the employees' perspective, their goals are to get paid for services rendered and to go home on time. However, if the system was not designed properly, the users will have a difficult time using the timekeeping system. The employees will spend more time trying to figure out how to use the system. As a result, the goal of going home on time will not be met (Hackos & Redish, 1998). In order to design successful products, there is a need to understand the goals of the users and also the goals of the company (Hackos & Redish, 1998).

Visual Design

There are many studies on Web site usability and not much on visual aesthetics on Web design. When studies on aesthetics are done together with Web design, the subject matters discussed are beauty, delight, appreciation, site preference and usability (Hoffman & Krauss, 2004). According to Van def Heijden (as cited in Hoffman and Krauss), for example, found that attractiveness contributes to ease-of-use, enjoyment, and

usefulness. The elements of visual aesthetics, because it is an effective communication tool, can influence the perceptions of the viewer (Hoffman & Krauss, 2004). It is important to note the goal of visual aesthetics: "The aim of visual aesthetics is to induce the user to unknowingly, unconsciously, and unsuspectingly choose to become involved in the message and the Web site of concern (Krauss, 2004)" (Hoffman & Krauss, 2004, p. 205).

Visceral design is similar to visual aesthetics in the sense that it captures the viewer's interest through physical features. Visceral design is about the first response of the consumer or user on the product upon the initial encounter (Norman, 2004). A very good visceral design yields a reaction to want the product by mere looks. The question on how it works comes as secondary only. And finally, the cost of the product comes in (Norman, 2004).

Visceral design can be seen in merchandise being showcased in stores, print media, and elsewhere where appearance is key in attracting product use and sale (Norman, 2004). Norman emphasizes that many products are bought solely on looks. If the product is not visually stimulating, the consumer may opt not to buy the product even if it has excellent ratings. An example of a product that had such an impact based on appearance is Apple's iMac computer that came in a variety of colors. Consumers bought the product knowing that underneath the colorful cover it contained the same parts found in the other Apple computers, which were not doing well in terms of sales (Norman, 2004). The iMac exuded an emerging requirement, which is desirability (Fogarty, Forlizzi, & Hudson, 2001). Fogarty et al. elaborate, "Products such as the Apple iMac have shown that selling computers is starting to be about 'cool' and 'interesting' and even

'beautiful', as well as 'understandable', 'easy to use', and 'powerful'" (p. 141). Truly, the emotional impact captivates, "At the visceral level, physical features–look, feel, and sound–dominate" (Norman, 2004, p. 67).

Information Architecture

A Web site may have a lot of information to offer to its user. Locating the information can get challenging. This is where the Web site's navigation feature is helpful. Navigation is the manner in which the desired information is found in the confines of the Web site. A Web site with a well-thought out navigation design makes it effortless for users to find the information they are looking for (Department of Health and Human Services, 2006).

Although it may seem that navigation only involves linking pages, Garrett (2003) claims three concurrent goals must be attained when creating the navigation design of any Web site. The first is to enable the user to get from one Web page to another. This process should simulate how the user would actually go around the Web site (Garrett, 2003).

The second goal is "the navigation design must communicate the relationship between the elements it contains" (Garrett, 2003, p. 126). It is not sufficient to group a number of links together. The links must show the relevance with each other. Some links may be important than other links (Garrett, 2003). Garrett further states, "This communication is necessary for users to understand what choices are available to them" (Garrett, 2003, p. 126).

The third goal is about the navigation design's ability to communicate the relationship between its contents and the page the user is currently viewing" (Garrett,

2003, p. 126). This goal provides support where a user may be at a particular page and is able to see options to assist him in attaining the task he is performing (Garrett, 2003).

Garrett (2003) explains the difference between physical space and information space. In a physical space, people, once inside a building, are able to find their way wherever it is they are going to. In an information space, such as a Web site, the mechanisms in our brain used in finding one's way around in the physical space cannot be utilized. Garret emphasizes the need to inform the user about their location in the Web site and where they can proceed. Garrett points out that it is debatable as to how Web sites users orient themselves when they are in a site. Some draw little maps in their head just like when they are in a hardware store or library. Others relay on the navigation system presented to them by the site.

Online User Behavior

The Internet offers various forms and flavors of Web sites. Online users have expectations and their own practices whenever they are using the Web. The presentation of Web site content plays a role in matching the behavior of online users. People go to the Web to search for something, possibly from a number of Web sites. The sooner they find what they are looking for, the better (McGovern & Norton, 2002). The user's dissatisfaction increases when they spend a longer time looking for content in your Web site (McGovern & Norton, 2002).

It is often thought that simple information should be available or at least located at a conspicuous area on the Web page. But this is not always the case. An example, by McGovern and Norton (2002), is the contact information of the company. The user can spend a long time looking for this basic information.

Online users are busy and pressed for time. They only want to see content that is relevant (McGovern & Norton, 2002). McGovern and Norton suggest, "If you want to communicate with your reader, start off by writing in a language that does not confuse them. Write simply. Write directly. Write concisely. Remember, your reader is in a hurry. Get to the point" (p. 55). Readers on the Web briskly go over the text and pick up the main points. McGovern and Norton point out a study, which was done by Sun Microsystems, where it was determined that 79% of online reader engage in scan-read.

Users expect content to be up-to-date. According to McGovern and Norton (2002), "A 2000 survey by NOP of large UK firms found that 77% admitted their Web sites contained out-of-date content" (p. 66). McGovern and Norton point out that people stay away from Web sites with out-of-date, poor quality content. The Web sites with current content are considered excellent sites while Web sites with dated content are not (McGovern & Norton, 2002).

Summary of Conceptual Design

This section discussed conceptual models where the user's mental model influences her quality of interaction with the product. A product's appearance (system image) may communicate a different message compared to how the user thinks it should work (user's mental model). These two images must match to produce a highly usable and useful product. There was a discussion on the need to understand who the users are since there are many users performing different tasks to support the organization's goals. The requirements of these users must be met. Building a persona model helps identify the various types of people who will be using the system. The persona model aids in designing the product. An area to consider when developing a product is its appearance

because it captures the interest of the user. The beauty of the product contributes to ease of use, enjoyment, and usefulness. The objective of visual design is to persuade the user to be engaged with the Web site. The sound structure of information assists users to locate what they are looking for, know where they are in the site, and where they can go next. A Web product uses information space versus physical space (to which we are accustomed). Thus, users have to be guided to get to where they want to go or to conveniently find what they came for. When people use the Web, they perform tasks differently. They scan not read what is in front of them. Also, users do not want outdated information. A Web site must always have up-to-date information. Otherwise, the users will not trust what your site has to say.

Chapter 3: Methodology and Procedures

Overview

A Web site has a lot of good uses. The site makes available information and applications to users as long as there is a computer and an Internet connection. As a Web site contains a lot of information and uses web applications, it is possible that issues exist in terms of how users interact with the web product. Oftentimes, a user gets confused on how to use the Web site. As a result, the user experiences challenges in completing the desired tasks.

The purpose of the study was to explore the different facets that contribute to the usability of Web sites. This chapter identifies the specifics of the study that was conducted. The chapter contains the following sections: (a) research approach and design, (b) pilot study, (c) subjects, (d) consent procedures, (e) instrumentation, (f) validity and reliability, (g) procedures, (h) data collection and recording, (i) data process and analysis, and (j) limitations.

Research Approach and Design

This study was about the usability of a university Web site and thus a usability test was conducted. "A usability test is an empirical evaluation method" (Dumas & Redish, 1993, p. 312). Therefore, this research is an empirical study. It used a specified number of participants in its testing. The usability test was performed on four university Web sites.

Pilot Study

Dumas and Redish (1993) highly recommend performing a pilot test because it is rare that a usability test will be free of any fault without conducting a pilot test. The pilot

test determined if the actual test would work. The pilot test used the same set of procedures that would be used in the actual test. A pilot test participant went through the various activities simulating the actual test. Data would be gathered as if it were the actual test but data analysis would not be performed nor would the collected data be added or used in the actual test.

A pilot study was conducted per the recommendation of the Dumas and Redish. The test procedures were run to simulate an actual test. Data were gathered but were not used in any analysis nor were data added to the data collected in the actual test.

Subjects

The subjects for this study were graduate students. As this study was about the quality of interaction between the users and the Web site, the subjects were screened to ensure that there was a level of experience in using the World Wide Web. The subjects filled out the Participant Questionnaire (see Appendix C).

There were two types of subjects. One type was the pilot test subject. This subject was involved in the pilot test only. The next type was the actual test subject. This was the tester for the main test only. All subjects, regardless of type, are referred to as testers, participants, or test users in this study.

Usability testing does not require a large number of testers. Krug's (2006) formula for testing is to have three to four testers for each round of testing. Krug points out that the major issues will be detected in the first round of testing. The problems encountered in the initial testing need to be addressed before the next round of testing. Once the issues have been resolved, the testers will uncover a new set of issues in succeeding tests (Krug, 2006).

Stone, Jarrett, Woodroffe, and Minocha (2005) recommend using five users. Nielsen (2000) explains why it is effective to use only 5 testers. Before the start of the test, the usability problems are unknown. When the first tester goes through testing, the collected data will give a lot of information about its usability (Nielsen, 2000). The obtained information constitutes "almost a third of all there is to know about the usability of design" (Nielsen, 2000, para. 3). As more testers perform their examination of the Web product, there will be little information gained about its usability. Many of the observed data will come from either the first or second tester (Nielsen, 2000). Adding more people to test is not really beneficial because the same observed data would be seen numerous times. Also, there will be overlapping data collected. There is no need to conduct more tests (Nielsen, 2000). Instead, redesigning the Web site is more appropriate (Nielsen, 2000; Stone, et al., 2005). Nielsen (2000) claims, "After the fifth user, you are wasting your time by observing the same findings repeatedly but not learning much new" (para. 7). It does not make sense to see the same issues reported repeatedly by different participants. This can get aggravating (Stone et al., 2005).

Consent Procedures

This researcher adhered to the university's policy on human subject research. The university's Protection of Human Participants in Research: Policies and Procedures Manual was used for guidance. This manual includes the university's Institutional Review Board (IRB) processes and policies. The approval of the university's IRB was sought prior to starting the research. Also, the researcher of this study has taken the university's class on IRB regarding the use of human subjects in research.

Part of Section III of the university's IRB Review Process talks about protecting human subjects in the course of the research. The concerns are on: (a) risks and benefits (pertains to minimal risk), (b) informed consent, and (c) confidentiality and privacy. This research ensured that the concerns above were addressed.

The test participants did not undergo exposure more than the minimal risk during the usability test. Dumas and Redish (1993) quoted the Federal Register's definition of minimal risk as "the probability and magnitude of harm or discomfort anticipated in the test are not greater, in and of themselves, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests" (p. 205). Normally, there is no physical risk greater than the minimal risk when testing software (Dumas & Redish, 1993). If it is deemed that the participants will be put at risk, the researcher has three options: eradicate the risk, consult and adhere to federal policies, or discontinue the test (Dumas & Redish, 1993).

Both the researcher and the test participants need to be protected in the course of the usability testing. An informed consent document was drawn up. In an effort to show respect, the participants were free to decide on what should or should not happen to them (Dumas & Redish, 1993). There are three components of an informed consent: (a) information, (b) comprehension, and (c) voluntariness.

Information. The informed consent document describes: (a) the procedures undertaken by this researcher, (b) what was the purpose of the test, (c) identified the participant's risks, (d) expressed that the participant were given the chance to ask questions, (e) made clear that the participant could leave any time without starting or finishing the test (Dumas & Redish, 1993).

Comprehension. The information in the consent form must be accurately discussed with the participants. The research would ensure that the participants understood what was going to take place and encouraged them to ask questions (Dumas & Redish, 1993).

Voluntariness. No pressure would be applied when obtaining the participant's consent. The participant was free to participate or not participate in the testing (Dumas & Redish, 1993). The participants have rights in relation to usability testing. Dumas and Redish list the participant's rights:

- the right to withdraw at any time without penalty
- the right to ask for a break at any time
- the right to the protection of privacy by not using their names
- the right to know what the test is about and what they will be doing (p. 207).

Confidentiality and privacy are not the same. Burmeister (2000) distinguishes the two, "Confidentiality is different from the participant's privacy; it refers to how data about the participants will be stored" (p. 5). Data collected were not associated with the participant's true identity. Pseudo names, like Tester 1, Tester 2, etc., were assigned to each filled out test questionnaire and associated notes taken by the researcher. Burmeister also suggests getting a signed waiver from the participants. The waiver stated how the collected data, using the test questionnaire and any notes – whether confined to this test or would be used in an extended capacity. The participants could then make an informed decision.

Instrumentation

Rubin (1994) distinguishes usability testing from user-centered design (UCD), "Usability testing is not UCD itself; it is merely one of several techniques for helping ensure a good, user-centered design" (p. 11). Usability evaluation comes in two forms;

summative evaluation and formative evaluation (Zhang, 2007). Zhang gives the difference between summative and formative.

> Summative evaluation aims to collect usability metrics and gain an understanding of the overall usability of the user interface design. Formative usability evaluation is meant to identify problems in the design and thus provide input for redesign in order to improve usability. (p. 210)

Sauro and Kindlund (2005) enumerated the usability parameters, as defined by the American National Standards Institute (ANSI) 2001 and International Organization for Standardization (ISO) 9241, which are effectiveness, efficiency, and satisfaction. There are measurements for each of the dimensions. Effectiveness covers completion rates and errors. Efficiency is about time spent on the task. Satisfaction is tracked by completing a standardized satisfaction questionnaire. There are two ways to collect the satisfaction data. One is after completing each task. The other is after the test session has ended.

A copy of the instruments to reflect effectiveness, efficiency, and satisfaction can be found in Appendix A and Appendix D. Table 1 is the matrix showing the research questions, how the data were collected, and the statistical instrument used.

Table 1

Research Questions Matrix

Research Questions	Method of data collection	Statistics Used
1. How did the students rate the level of difficulty in completing each task?	Tasks Questionnaire, Comments from testers, Observaton notes from researcher, Post Test Questionnaire	1 to 5 scale (Likert)
2. What did the students find most helpful in completing the tasks?	Comments from testers, Observaton notes from researcher, Post Test Questionnaire	1 to 5 scale (Likert)
3. What did the students find least helpful in completing the tasks?	Comments from testers, Observaton notes from researcher, Post Test Questionnaire	1 to 5 scale (Likert)
4. How satisfied are the students in using the portal?	Post Test Questionnaire, Observation notes from researcher Comments from testers	1 to 5 scale (Likert)

Validity and Reliability

The validity of the instrument refers to its capability to produce results to satisfy goals (Isaac & Michael, 1995). In the case of this study, the instrument was valid if it was able to produce information to answer the research questions. The researcher asked an expert to review the test instruments. The researcher adjusted the instruments, per the suggestion of the expert, to ensure clarity on what was being asked from the test participants.

An instrument is reliable if it exhibits consistency and stability in its measurement (Isaac & Michael, 1995). To show consistency in results, there must be two measurements. The same individual needs to take an identical test for the second time

(Isaac & Michael, 1995). With usability testing, especially when the study is about completing tasks, there is the factor on the test participant's part of becoming familiar with the tasks. As the level of difficulty of completing a task is being measured in the study, asking a test participant to take another test to assess reliability will have an impact on the results. Upon taking the identical test, the test participant becomes familiar with the tasks to complete and may possibly give a different level of difficulty.

Procedures

There are a number of tasks to be completed prior to testing. The logistics have to be identified because some activities need to take place before other activities can be started.

Authorization from the Subject Universities

Permission from the subject universities to conduct the study was sought and was granted to the researcher.

Identify the Subjects

The subjects, also known as either testers or participants, were solicited to participate in the test. When the prospective testers were asked to participate in the testing, the researcher briefly discussed what the test was about to give the would-be subjects an idea on what they were being asked to do. The subject was given the right to decline involvement in the testing. A subject was identified to perform the pilot test. The subject who participated in the pilot test did not participate in the actual test. A group of testers was assigned to take part in the actual test.

The subjects, both taking the pilot and actual tests, were contacted to schedule the test date. Once the testers confirmed the date, the test location was determined and

scheduled. Dumas and Redish (1993) recommend contacting the testers twice. The first call is two weeks before the test. Then, a reminder call was made one or two days before the test.

Participant Questionnaire

The testers were asked to complete the Participant Questionnaire prior to testing. The questionnaire depicted the participants' experience in using the computer and Internet.

Test Location

The proposed location was at one of the university's campus locations or in a location where there was a room that could be set up as a testing room, such as, but not limited to, a public library or office building. The test took place where it was convenient for the testers to come in to perform the test (e.g., West Los Angeles if the participant was close to this location). What was important in the location was the Internet connection. The room was reserved in advance through the administrative office of the particular campus. The room did not have any video or audio equipment to record the testing.

Introduction and Orientation Speech

Rubin (1994) suggests preparing a speech to greet the testers and give them an orientation of what was the purpose of the test. An overview of what they need to do was also given. The researcher prepared the introduction and orientation speech (see Appendix E). The testers were assured that no personal information about them would be collected and that their identity would not be associated with the feedback that they would provide during the test.

List of Activities on Test Day

Dumas and Redish (1993) outlined a series of activities, which occur on a typical test day. Some of the activities are arriving at the test location before the participants arrive in order to prepare the test room, and materials to be used. The suggestion above by Dumas and Redish were performed together with testing computer and the Internet connection.

Institutional Review Board

There are ethical principles and Federal guidelines to be conformed to when dealing with human participants in research. These principles and guidelines ensure the participants' dignity, privacy, and confidentiality are not violated. The university's Institutional Review Board (IRB) regulates policies concerning studies involving human subjects. This researcher abided by the guidelines set forth by the university's IRB. No test, in any form, was conducted with the human subjects without the university's IRB expressed approval.

With the initial review of the U.S. Code of Federal Regulations (CFR) DHHS, this research fell under the exempt criteria of 45 CFR 46.101(b)(2). The IRB Application for a Claim of Exemption form was filled out and submitted for approval. Also, the approval from the faculty supervisor was sought using the Faculty Supervisor Review Form.

Data Collection and Recording

Dumas and Redish (1993) point out that the test participants, whether in the pilot test or actual test, are helping out in the test. They are taking time out from their regular activities to assist in the testing. It is important to consider the test from the participants'

perspective. It is possible that the participants are nervous about the test upon arrival at the test location. Dumas and Redish suggest making the participants comfortable before the test starts. To establish rapport with the testers, engage in a conversation and offer refreshments. Dumas and Redish also advise on making the participants feel safe and let them know they are in good hands.

Before starting the test, the researcher gave his introductory speech and went over the test procedure. Rubin (1994) strongly advises that the prepared speech be read word for word and not from memory or in a spontaneous manner. The reason for this was so that the message and the instructions were the same for all testers. The questionnaire was discussed to ensure that the subjects understood how to fill out the form. The participants were encouraged to be candid in their responses. Rubin suggests that the subjects "perform in the way that is typical and comfortable to them" (p. 109). The researcher emphasized that it was the Web site that was being tested and not the participants' computer skills (Rubin, 1994).

The test participants were asked to complete a list of tasks using the university Web site. The tasks are identified in the Tasks Questionnaire (see Appendix A). Associated with each tasks were questions to be answered by the participants. The amount of time in completing each task, in seconds, must be logged in the questionnaire. No time limit was set for each task. The testers attempted to complete each task at their own pace. On the questionnaire, the participant were identified by a number not by her name. The anonymity and privacy of the tester's identity were ensured. The date of the test was indicated in the questionnaire.

When a user is using a Web site, like checking e-mails and searching for materials, it is normally done alone without anybody looking over the user's shoulder. Dumas and Redish (1993) recommend keeping the interaction with the participants at a minimum. Let the test mimic a scenario where the user is alone doing her business. It was possible that questions would be asked during the test. The questions were to be answered carefully so as not to produce bias or lead the tester into a positive or negative evaluation of the product (Dumas & Redish, 1993). There are strategies in answering the questions. Here are a couple of suggestions by Dumas and Redish (1999):

> Turn the question around. Participants might ask. "Do I use Help to find that out?" The participants may be asking you to give them the answer, or they may just be unsure. In either case, you do not want to lead them. You might say, "What do you think you should do," or "I would like you to figure that out." Or "I can tell you what you should do, but I'd like you to keep trying."
>
> Participants might ask, "Did I do that right?" An appropriate response would be, "Do you think you did it right?" Knowing how confident participants are can be useful information. If they are not confident, the software may not provide enough feedback to their actions.
>
> Don't answer the question directly. Participants might ask, "Did everyone else have as much trouble as I did?" You might respond, "Did you have more trouble than you expected?"
>
> Participants might ask, " Do you want me to tell you when I don't like something?" You should respond, "Tell me what you like and what you don't like," or "I'd like to hear any reactions you have about the product, good or bad." (p. 298)

As the test calls for completion of a list of tasks, the participant may experience frustration when difficulty in accomplishing the tasks is encountered. If the frustration level escalates, either anger comes into play or the tester will think the shortcoming is her fault (Dumas & Redish, 1993). When such a situation takes place, Dumas and Redish recommend taking a short rest. If they are angry, talk to them about the important role

they have in improving the product so that future users will not have to go through what they are going through. If they are nervous, remind them that you are testing the product not their ability to use it.

If the participants experience difficulty in completing a task, the questionnaire has a section to indicate the non-completion of the task and a space to provide their comments. It is important to remind the testers that their input is valuable. They should share their thoughts in order for the test to be successful. Dumas and Redish (1993) give advice, "You should be compassionate. If you have seen enough to know the product needs work, don't push participants beyond endurance" (p. 302).

Taking down notes during the usability test is important. The comments made by the participant while completing a task must be logged. Also, the researcher's observations will be captured. The participant may state out loud asking herself where to find an item. However, it is observed that the user is looking at the wrong place. The participant's comment and the observed actions must be noted in the log (Stone et al., 2005). Stone et al. say that if you can convince the tester to verbally share her thoughts, you will learn about the usability shortcomings of the system. There are advantages and disadvantages when collecting comments made by the participants. Stone et al. give examples:

> There are other advantages:
> - You get immediate feedback on the way the participant is thinking about the interface and any problems or surprises.
> - Because the participants are continuously explaining what is happening, thinking aloud can help them to focus and concentrate
>
> There are, though, some disadvantages:
> - Some participants can find thinking aloud unnatural and distracting
> - Thinking aloud can slow the participant's thought processes. This could have an effect on task performance. Because the participants are

> performing the task with greater concentration and at a slower pace while thinking aloud, they are less likely to commit errors as when working in their usual environments.
> - Sometimes it can become very exhausting for the user to verbalize thought processes for the duration of the evaluation session. (p. 478)

When the test participant completed the list of tasks, the researcher collected the questionnaire. The researcher thanked the participant and expressed appreciation for her valuable contribution.

Data Process and Analysis

The test generated a substantial amount of data from each tester. These data are either related to performance measures or subjective measures. Performance measures deal with "counts of actions and behaviors that you see" (Dumas & Redish, 1993, p. 184). Examples of performance measures are the amount of time to complete a task, the frustration and confusion observations, and exhibition of satisfaction (Dumas & Redish, 1993). Because performance measures collect counts, the collected data are classified as quantitative (Dumas & Redish, 1993). Dumas and Redish caution on counting the user's behavior, such as the display of frustration. This is a judgment decision and Dumas and Redish suggest having one person perform the counting in the usability test for consistency. This researcher was responsible for doing all the counts.

Subjective measures are about "people's perceptions, opinions, and judgments" (Dumas & Redish, 1993, p. 184). Dumas and Redish elaborate,

> Subjective measures may be either quantitative or qualitative. For example, you can give people a 5-point or 7-point scale and ask them to rate how easy or difficult a product is to use. The judgment is subjective, but you get a quantitative response. You can talk about the participants' average rating of the product. You can also collect participants' spontaneous comments about the product by asking them to think out loud as they are working with it. Their comments are both subjective and qualitative. You can, however, report frequencies – that is how many people made comments about a particular problem. (p. 187)

For this study, the spontaneous comments made by the testers were part of the measure. Other examples of subjective measures, which were also used in this study, are ratings on the product's ease of use and the user's satisfaction.

The main objective of a usability study is to make evident the product's inadequacies or concerns. Thus, it is essential to focus on these areas (Dumas & Redish, 1993). There is a need to gather helpful information, "That means collecting data on time, errors, and frustrations" (Dumas & Redish, 1993, p. 193). It is possible that the testers have positive comments to share, like when they experience satisfaction (Dumas & Redish, 1993). The participants were encouraged to express their positive thoughts by asking them to speak out loud and by providing any other thoughts in the comments section of the questionnaire.

The usability test will bring about a large volume of data even from a small group of testers. There were different types of data, such as the amount of time to complete a task, the user satisfaction data, and comments (Dumas & Redish, 1993). The collected data was either in the form of performance or subjective measure. The data was summarized and tabulated by task for every participant (Dumas & Redish, 1993). The posttest data, which were a subjective measure, was tabulated in a similar manner as the task times. The comments made by the participants, either from the questionnaire or by talking out loud, were also logged (Dumas & Redish, 1993).

The techniques mentioned above are all about describing the data collected. Therefore, descriptive statistics was used in interpreting and analyzing data (Dumas & Redish, 1993). Dumas and Redish reveal, "In most of the usability tests we have conducted, we only need to use these simple descriptive statistics along with qualitative

data, such as test participants' comments, to document the case for the presence of usability problems" (p. 318).

Limitations

The usability test was conducted on a Web product that was already deployed and being used. A usability test is normally done in an iterative process on a product that is being developed, where the defects found are fixed and the product is tested again. However, usability test can still be done on a fully developed product. Don and Petrick (2003) say, "Usability testing of your company's existing product can give you invaluable design insights" (p. 74).

The study was not a full-blown test where there were resources to allow for different roles (e.g., a person recording notes or a person who assists when technical issues arise) while the test was taking place. Further, a formal usability laboratory was not used. In lieu of a usability laboratory, any decent-sized room is adequate. It has been suggested, "Use a conference room as a testing lab. Any testing you can do is better than no testing at all" (Don & Petrick, 2003, p. 74).

Summary

There were sizeable quantitative data generated by the study. There were data in the form of amount of time (logged in minutes) and counts. On the other hand, there were data that would initially appear as qualitative data but using a 5-point scale (e.g., a Likert scale) would yield quantitative data. In addition, certain data, like the comments made by the tester, could be reflected as frequencies, thereby, producing quantitative data, as well.

Extreme care should be exercised in handling data. The researcher examined his handwritten notes right after the test while the thoughts were still fresh. A quick review

of the questionnaires before the test participant left the room was also performed. The researcher ensured the notes were readable and could be understood.

As the study involved human subjects, the test participants' privacy rights were protected, as well as, confidentiality and any other items mentioned in the informed consent form and the waiver. The human subjects were treated with respect and dignity.

Chapter 4: Data Collection and Analysis

Overview

The research is about conducting a usability study on four university Web sites. The purpose was to determine the different facets that contribute to the usability of the subject Web sites. The Web sites tested were fully deployed, production versions accessible to the public. Permission was obtained from the respective universities to conduct the study.

There were two instruments used to gather data. One was the Tasks Questionnaire, which captured input from the test participants as each task was performed. The other instrument, Post Test Questionnaire, was utilized to record the participants' overall experience on using the Web site. These instruments aimed to answer the research questions identified below in the Restatement of Research Questions section.

There were five test participants, all graduate students from the researcher's university, who tested the subject university Web sites. The participants, as shown in the following section (Participants), were not new to using computers and the Internet. They have a great degree of experience. The researcher sought and obtained the university's Institutional Review Board permission to use human subjects to participate in the study. Permission was granted.

Participants

Table 2 shows the participants' profile in terms of non-Internet computer usage. All the participants use the computer for non-Internet purposes, such as creating

documents, spreadsheets, presentations, etc. Sixty percent spend more than 40 hours a week; twenty percent spend between 6 and 10 hours; and, 20% between 21 and 40 hours.

Table 2

Participants' Non-Internet Computer Usage

Number of Hours Per Week on Non-Internet Computer Usage	Percent of Participants
Between 1 and 5 hours	0
Between 6 and 10 hours	20
Between 11 and 20 hours	0
Between 21 and 40 hours	20
More than 40 hours	60

Table 3 shows the profile in relation to Internet usage. The majority (at 60%) has been using the Internet between 11 and 15 years. Among the participants, 60% spend more than 40 hours a week on the Internet. The Internet also serves as a place to conduct activities, such as shopping, banking, or looking for information by simply being in front of a computer.

Table 3

Participants' Internet Usage

Internet Usage	Percent of Participants
How long have you been using the Internet	
Between 1 and 5 years	0
Between 6 and 10 years	0
Between 11 and 15 years	60
Between 16 and 20 years	20
More than 20 years	20
How much time per week	
Between 1 and 5 hours	0
Between 6 and 10 hours	0
Between 11 and 20 hours	0
Between 21 and 40 hours	40
More than 40 hours	60
How do you use the Internet	
Find information	100
Shop	100
Entertainment/Gaming	60
News	80
Online banking	100
Pay bills	100
Social networking (Facebook, MySpace, Twitter,	80
Other	0
Research (Education)	20

Restatement of the Research Questions

The study has the following research questions. The questions revolve around how an individual interacts with the subject Web sites.

1. How did the students rate the level of difficulty in completing each task? A

list of the tasks to be performed by the students is in Appendix A.

2. What did the students find most helpful in completing the tasks?
3. What did the students find least helpful in completing the tasks?
4. How satisfied are the students in using the Web site?

Research Question No. 1

This section addresses the first research question: How did the students rate the level of difficulty in completing each task?

University A

Below is data collected from University A. Figure 2, University A – Difficulty Rating: Percent of Participants Per Task, shows the test participants' difficulty rating on each task. Seven out of the eight tasks have more than 40% of the participants rating the tasks as Easy/Very Easy. Some comments made by the participants in relation to the easiness in completing the list of tasks were “Easy to find” “This was very easy”, and “Pretty easy, but not as easy as other Web sites.”

The most difficult task to do was Task 4 – “How many credits are required to finish the program?” The combined rating for Difficult and Very Difficult amounted to 40% of the participants. The comments collected to reflect the difficulty were: “No clear information showed on this Web site even after trying different links.” “I don’t like how busy the front page is and the categories are very unclear – at some point I gave up and typed in Search what I wanted” and “very difficult to find detail – frustrating.”

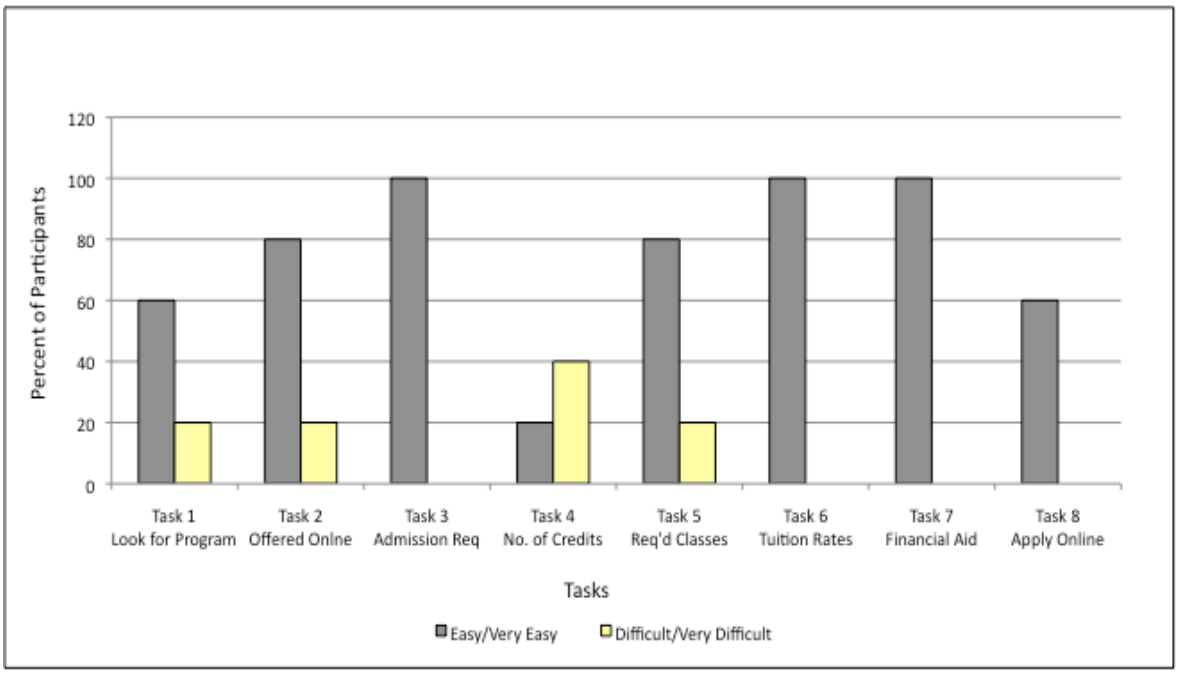

Figure 2. University A – Difficulty rating: Percent of participants per task.

Figure 3 reflects the completion rate per task for University A. It shows how many participants successfully completed each task. Along with the success rate is the metrics for the participants who made more than one attempt in completing the task. Five out of eight tasks (Tasks 1, 3, 6, 7, and 8) were successfully completed. Although the tasks were completed, two (Tasks 1 and 3) necessitated more than one attempt to finish the task.

Out of the eight tasks, three tasks (Tasks 2, 4, and 5) were not completed successfully. Tasks 2 and 5 have one participant or 20% who made more than one attempt to complete the task but still was not able to do so. Task 4 has 40% of the participants attempting to complete the task more than once. One of these participants, however, was able to complete the task and the other was not successful.

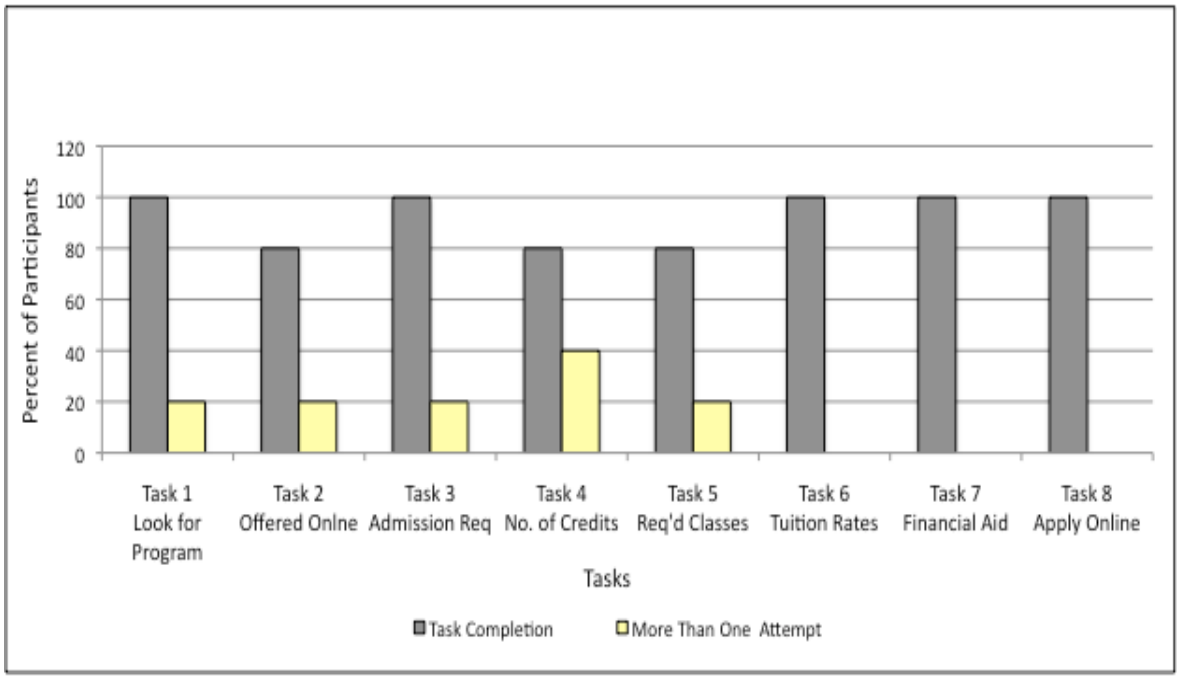

Figure 3. University A – Task completion and tasks with more than one attempt to perform.

Overall, the participants found University A's Web site easy to use from a task level standpoint as seven out of the eight tasks were rated Easy/Very Easy by at least 60% of the participants. The easiness was also supported by only having three tasks that were not successfully completed by all participants—4 out of 5 participants or 80% completed the three tasks, Tasks 2, 4, and 5.

University B

The difficulty rating data for University B is shown in Figure 4. There were two tasks that reflected a total of 100% of the participants who found it easy to complete the tasks. These were Tasks 4 (Identify the number of credits) and Task 5 (Determine the required classes). The comments made by the participants were "already saw this" and

"already saw this Web page", which both pertained to information previously seen while performing an earlier task. The use of Web page tools, such as tabs, yielded positive comments, "Tabs to left of degree info made it easy to find admission requirements." and "Very simple because there was tab that said degrees on home page."

There was one task that participants found the most difficult to perform. This was Task 3 (Determine the admission requirements), where 60% of the participants expressed difficulty in performing the task. As the university is not accepting new applications, the admission requirements information was not available. There was a statement in the Web page saying no application is being accepted at this time. However, the participants did not easily see the statement.

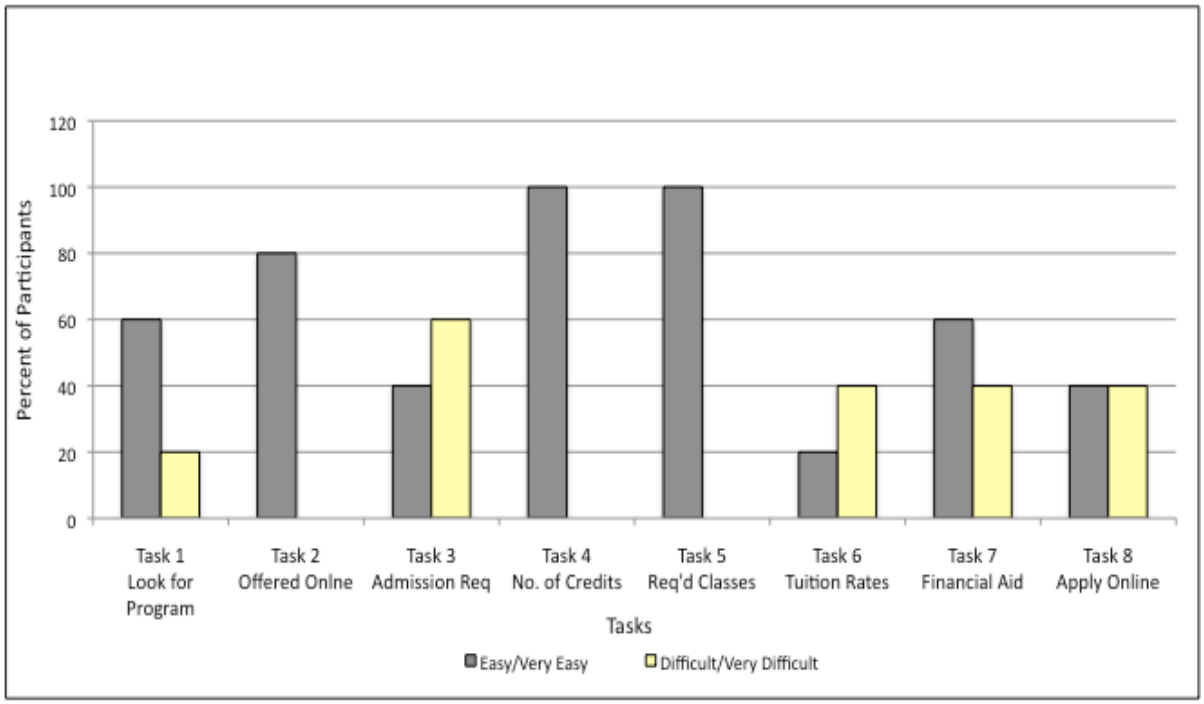

Figure 4. University B – Difficulty rating: Percent of participants per task.

Figure 5 has the completion rates for University B. All of the participants completed Tasks 1, 2, 4, 5, and 7 but there were participants who made more than one attempt. For Tasks 1 and 5, 40% of the participants made more than one attempt. For Tasks 1, 2, and 7, there were 20% of the participants who attempted more than once.

The information for Task 3 was not available but one participant reported that the information was found. There were 60% of the participants who attempted more than once to complete the task. For Task 6, 60% completed the tasks while 40% made more than one attempt. For Task 8, 60% completed while there was only one participant (20%) who made more than one attempt.

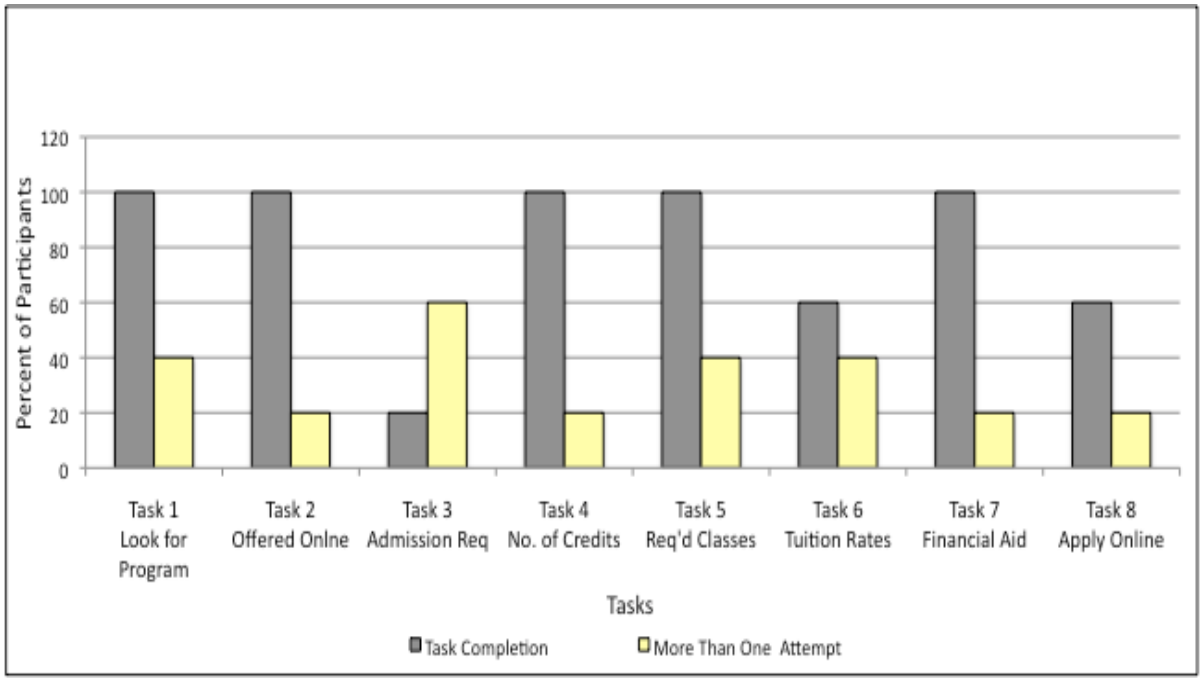

Figure 5. University B – Task completion and tasks with more than one attempt to perform.

For University B, there were five tasks out of eight that were rated Easy/Very Easy by at least 60% of the participants, which made the overall rating as easy. Task 3 was a challenge with 60% rating the task as Difficult/Very Difficult. The information on this task was not available.

For the completion rate, seven tasks out of eight were completed by at least 60% of the participants. Task 3 shows one participant (20%) as completing the task. The information for this task was actually not available.

University C

For University C, Task 8 (Finding out if applying online is offered) in Figure 6 shows a total of 100% of the participants responding to Very Easy and Easy. Some comments made in reference to easiness in completing the tasks were: "Very easy link to the curriculum.", "Tabs to left were very helpful in getting rates.", and "Very easy Admission requirements."

The most difficult tasks encountered by the participants were Tasks 1 and 5, which were: (a) looking for the program and (b) required courses, respectively. In relation to completing the tasks for this university, overall, the remarks reflecting difficulty were: "This was painful and is still not fully explained on the site" "Buried – too much text on homepage. Accreditation was more prominent than degree programs – WRONG." and "Too wordy – I don't like to have to read all this huge paragraph – get me to the point."

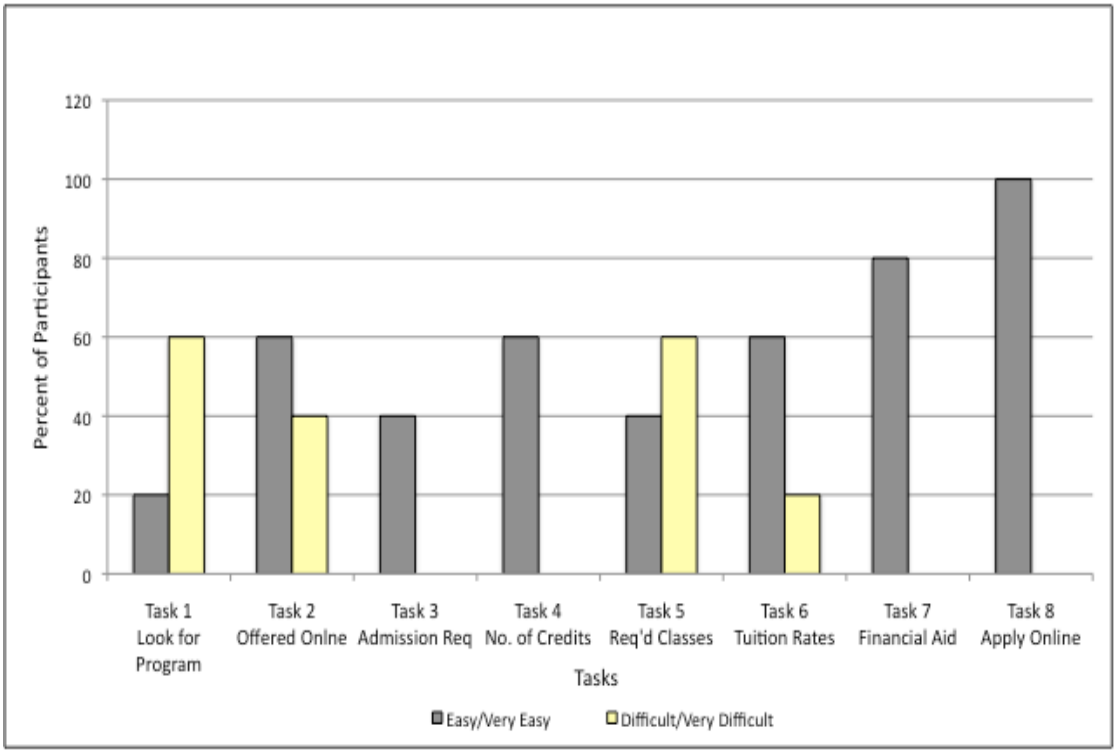

Figure 6. University C – Difficulty rating: Percent of participants per task.

For University C as shown in Figure 7, Tasks 1, 3, 4, 7, and 8 have 100% of the participants completing the tasks. Although with Tasks 1 and 3, 40% made more than one attempt. For Tasks 4, 7 and 8, 20% had to make at least an extra attempt to complete the task.

Only 80% of the participants completed the tasks for Task 2 and 6. These two tasks show 20% had to make an extra effort in finding the information. There were only 60% who completed Task 5. Also, 60% attempted more than once to complete the task.

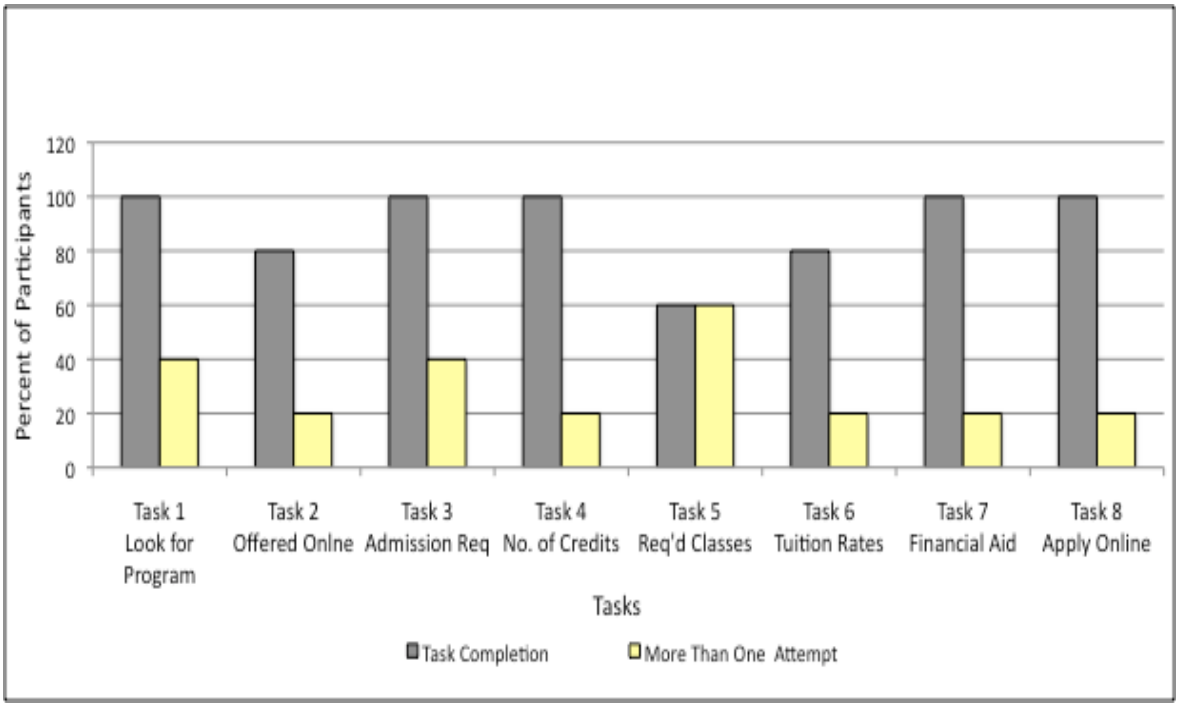

Figure 7. University C – Task completion and tasks with more than one attempt to perform.

Overall, University C showed five tasks out of eight with a rating, from at least 60% of the participants, of Easy/Very Easy. However, there were two tasks (Tasks 1 and 5) that showed 60% of the participants gave a rating of Difficult/Very Difficult. These tasks need to be looked at to determine the cause of a high percentage of participants giving a Difficult/Very Difficult rating.

For the completion rating, all tasks reported with at least 60% of the participants being able to complete the list of tasks. Task 5 is the only one with 60%. This task also shows 60% of the participants made more than one attempt to complete the task. There is a need to verify if there is a usability issue in completing this task.

University D

The difficulty rating for University D is shown in the Figure 8. All the participants (100%) agreed that Task No. 2 (Determine if the program is offered online) was Easy/Very Easy to complete. The information for this task was easily found, "Online programs are mentioned when looking at types of programs." One comment was simply, "Easy."

Three out of the eight tasks had a difficulty rating of Difficult/Very Difficult. Each of the three tasks only reflected 20% of the participants as having difficulty in completing the tasks. There was also confusion due to a number of windows opening up as links were clicked. This particular participant had to sift through "7 windows open. Have to click thru all of them to find tuition rates."

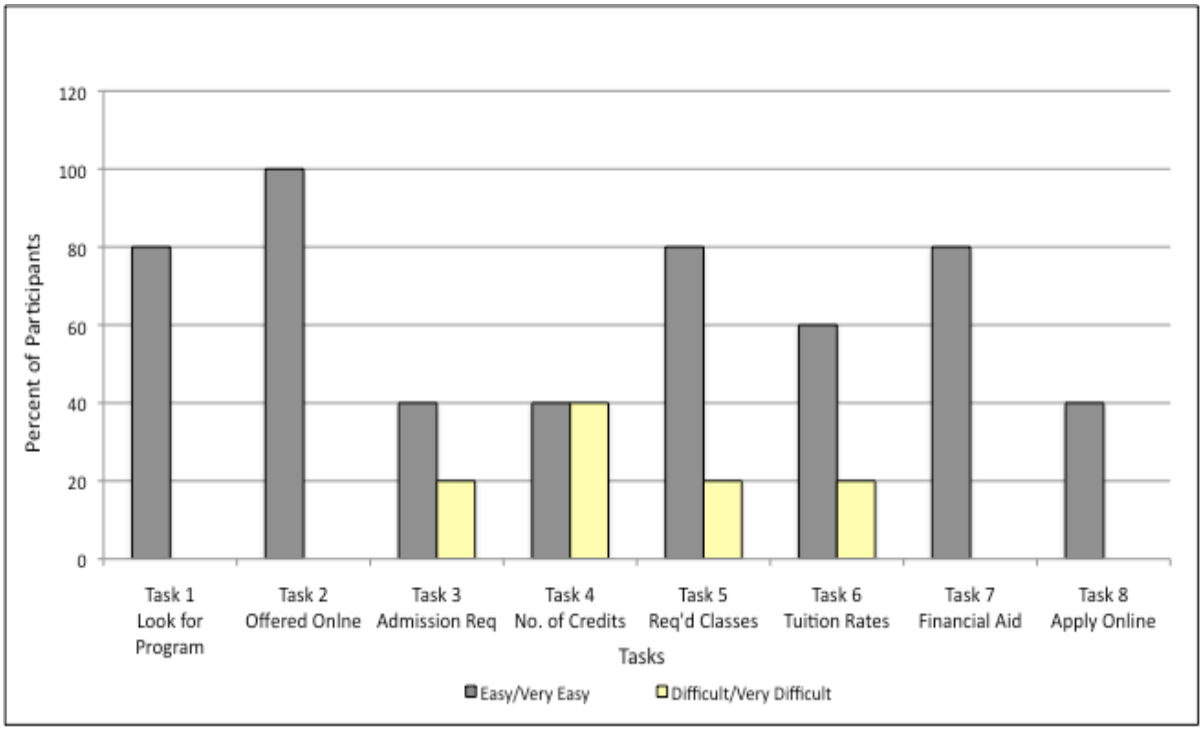

Figure 8. University D – Difficulty rating: Percent of participants per task.

The completion rates for University D are shown in Figure 9. Seven out of the eight tasks show 100% complete. Tasks 1, 2, and 7 do not reflect any participant who took more than one attempt to complete the tasks. Task 3 has 60% of the participants attempting to complete the task more than once. Tasks 5, 6, and 8 have 20% of the participants trying more than once to find the information.

Task 4 shows 80% completed the tasks. Forty percent tried more than once to complete the tasks. One participant even after trying more than one attempt did not complete the task.

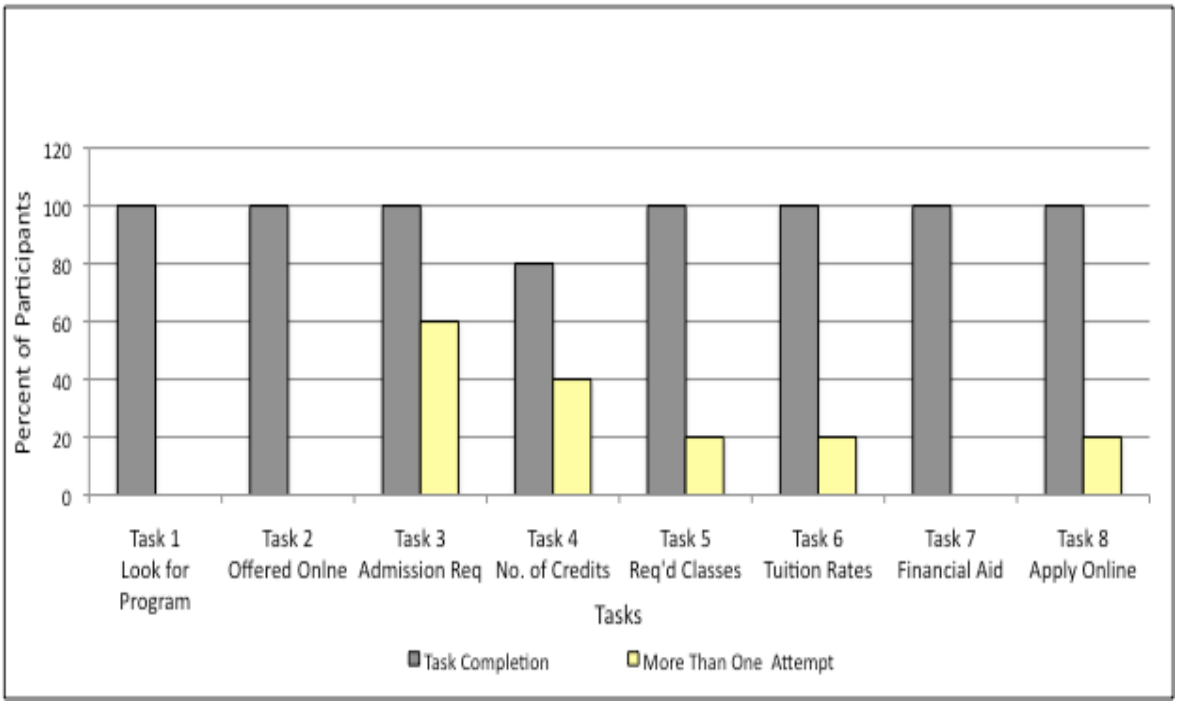

Figure 9. University D – Task completion and tasks with more than one attempt to perform.

For University D, five tasks out of eight have a rating of Easy/Very Easy from at least 60% of the participants. There were four tasks that had a Difficult/Very Difficult rating. One of these tasks had 40% of the participants responding, while the three other tasks had 20%.

The task completion rating only showed one task (Task 4) as not being completed. The rest of the tasks were totally completed. Task 4 even though showing as 100% complete reflected 60% of the participants attempted more than once to complete the task. Task 4 shows two participants (40%) attempted more than once with one of them (20%) not completing the task.

Summary of Research Question No. 1

The participants evaluated each university Web site by performing a set of tasks. After each task, the participants provided input on a number of questions related to the difficulty of the task.

The response for University A showed seven out of the eight tasks were rated as Easy/Very Easy by at least 60% of the participants. For Universities B, C, and D, five tasks out of eight were rated by at least 60% of the participants as Easy/Very Easy.

There were also data collected in reference to completion of each task and if there was more than one attempt to conduct the task. University A showed only five out of eight tasks were completed by all participants. Five tasks had at least one participant making an extra attempt to complete the task.

University B showed three tasks were not completed. All tasks required an extra attempt to complete the task.

There were three tasks that were not completed in University C. All tasks reflect there was more than one attempt to complete the tasks.

For University D, there was only one task that was not completed.

There were five tasks where participants attempted more than once to complete the task.

Research Question No. 2

This section discusses the analysis of the data collected and addresses Research Question No. 2, "What did the students find most helpful in completing the tasks?" The summary of the input provided by the participants produced three classifications on what was helpful in performing the tasks, which was looking for information in each of the university Web site. The three classifications are (a) Clearly Marked/Labeled; (b) Easy to Find; and (c) Helpful Navigation Aid. Table 4 shows the classifications, the different universities and the number of participants.

Table 4

Number of participants per university and most helpful classification

University	No. of Participants		
	Clearly Marked/Labeled	Easy to Find Information	Good Navigation Aid
A	2	4	1
B	0	3	1
C	2	5	1
D	1	2	0

Clearly Marked/Labeled

Clearly Marked/Labeled groups the input from the participants where the information was clearly identified. Participants completed the tasks easily because it was

perceived that the layout and presentation of the information made it easy. The hyperlinks, banner at the top of the page, and brief, concise statements contributed to making the information easily found.

Table 4 shows 2 participants (equivalent to 40%) provided input on this classification for Universities A and C. There was one participant, or 20%, who provided an evaluation for University D. Below are comments made by the Participants:

1. "Stated with link to program"
2. "Clearly identified"
3. "I like how it was in one sentence"
4. "In the top banner of page—very easy"

Easy to Find Information

The Easy to Find Information grouping is about being able to find the information with reasonable effort. The responses captured from this group alluded to how online users behave when surfing the Internet. Participants look for information by scanning what is in front of them. They quickly browse over the web page and search for what they are looking for. As the participants look through, they remember the information they come across. Thus, in the completing succeeding tasks, the participants remember what they have scan read previously. Some of the tasks are deemed complete because the information was found when the previous task was being performed.

Another characteristic of this grouping is the logical placement of related information. This made it easy for the participants to find the information they were looking for because they are ideally and logically placed together. An example is to have

the Financial Aid information where the tuition details are located, “Financial aid was in the same page as tuition.”

Table 4 has the breakdown for Easy to Find Information. Four participants (equivalent to 80%) gave a positive response on easily finding the information for University A. For University B, 3 participants (or 60%) found it easy to find what they were looking for. For Universities C and D, 5 participants (100%) and 2 participants (40%), respectively, commented that the information they were looking for was easy.

Here are other comments made by the participants:

1. “Easy to find”
2. “Very easy mentioned in the first paragraph”
3. “Very easy since I saw the rates in previous pages”
4. “Already saw this”

Helpful Navigation Aid

Web sites provide tools to its users for navigational purposes. These tools, often in the form of tabs and links, enable users to go from one page to another or from one particular section to another, where possibly the desired information is located. Table 4 shows one participant (20%) indicated that the navigation aids were helpful for Universities A, B, and C. Comments made were:

1. “I checked Admissions tab next to the info I was reading. Very helpful in getting Application info”
2. “Very simple because there was tab that said degrees on home page”
3. “Having a financial aid button on all the pages is very helpful”

Summary of Research Question No. 2

The responses provided by the test participants generated three classifications on what they found as most helpful when they were conducting the tasks. The classifications are: (a) Clearly marked/labeled; (b) Easy to find; and (c) Helpful navigation aid.

When Web users visit Web sites, they want to see items clearly marked and easy to identify. The links are labeled that was easy to understand. Short, to the point sentences also help.

Easy to find is when the online user goes about the Web site and finds the information they are looking for right away. Some information, at times, were found before the task was performed because if was read while doing a previous task.

Web sites employ navigation aids to help the Web user finds her way in the Web site. The navigation aids, such as tabs and buttons, are found to be helpful and made it easy to get around the site.

Research Question No. 3

This section details the analysis of the data collected in reference to Research Question No. 3, which is "What did the students find least helpful in completing tasks?" The analysis yielded three categories in grouping together similar issues. The categories are Content Presentation, Information Structure, and Navigation. Table 5 shows the graphical representation of these categories together with the respective universities and number of participants.

Table 5

Number of participants and category of issues encountered by university

University	No. of Participants		
	Content Presentation	Information Structure	Navigation
A	1	4	1
B	1	5	2
C	3	5	4
D	1	4	4

Content Presentation

Content presentation is how the user perceives the Web site visually. Content presentation involves the arrangement of the different parts, such as (but not limited to) the text, menu and tab placement, of a web page. The list below identifies content presentation-related issues gathered from the participants. The input has been summarized.

1. The page is busy. It is too wordy. There is a lot of text to go through.
2. The menu is confusing being on both right and left sides.
3. The use of bullets would have been helpful instead of paragraph format.

Table 5 displays the number of participants for each university per the content presentation category. Universities A, B, and D have one participant each, who reported issues. University C shows three participants who encountered difficulty in this category.

Information Structure

This study entails performing a number of tasks in four university Web sites. The tasks are about looking for information throughout the Web site. Web sites are not built

having the same features, page layout, content, information organization, and navigation system. Thus, at times, there is difficulty in locating the information. The information challenges encountered by the participants, in summary, are listed below.

1. Information cannot be easily found. In some cases, there were several attempts made before finding the information. At times, information cannot be found.
2. Missing information. Some basic information, such as number of credits, is not available.
3. Information is not organized. Information is found in unlikely places in the Web site.
4. Information is incorrectly titled. Common verbiage is not used, such as Financial Aid or Admission.

Table 5 shows the metrics on Information Structure. Universities A and B report four participants are having issues in this category. All the participants, a total of five, encountered information structure issues with Universities C and D.

Navigation

Navigation enables the Web site user to maneuver through the site by using mechanisms, such as hyperlinks, tabs, buttons, and search capability. These mechanisms allow the online user to get to the web page where the information they are looking for is located. At times, it may be necessary to go through a number of pages before finally locating the information. Below are a number of issues shared by the participants.

1. There are too many clicks to make before getting to the desired information. The user ends up digging for the information. This equates to

more time spent on looking for the information and not being productive and efficient.

2. New windows open to display information when links are clicked. Frustration arises, as the number of open windows increase, if the information is not found. In addition, with either too many windows are open or being brought to a number of pages, confusion sets in when there is a desire to go back to the starting web page.
3. The site is deemed as not user friendly when there are too many pages to go through in order to find the information.

Table 5 shows the breakdown for Navigation. University A shows 1 participant making a comment about its navigation feature. There are two participants who felt there were navigation issues for University B. For Universities C and D, there were 4 participants each who reported navigation issues.

Summary of Research Question No. 3

Based on the responses provided by the test participants, three issues were identified, namely (a) Content presentation; (b) Information structure; and (c) Navigation. These issues are present in the entire subject Web sites and are considered as least helpful in performing the tasks. Content presentation refers to what the Web user sees like a busy page, too many words, and the menu is confusing. Information structure refers to how information is organized in the Web site so that it can be easily found. There's expectation from the user about where the information should be but is found elsewhere. Basic information could be missing. In this case, the example was the credits information was missing. Navigation helps the online user to go from one place in the Web site to

another. The participants did not like when there were too many clicks on links to get to the information. When there are too many windows open due to links that were clicked, there is confusion on which window to use.

Research Question No. 4

This section discusses the data collected from the Post Test Questionnaire and addresses Research Question No. 4, which is "How satisfied are the students in using the Web site?"

University A

Figure 10 shows the feedback provided by the participants at the end of the usability test.

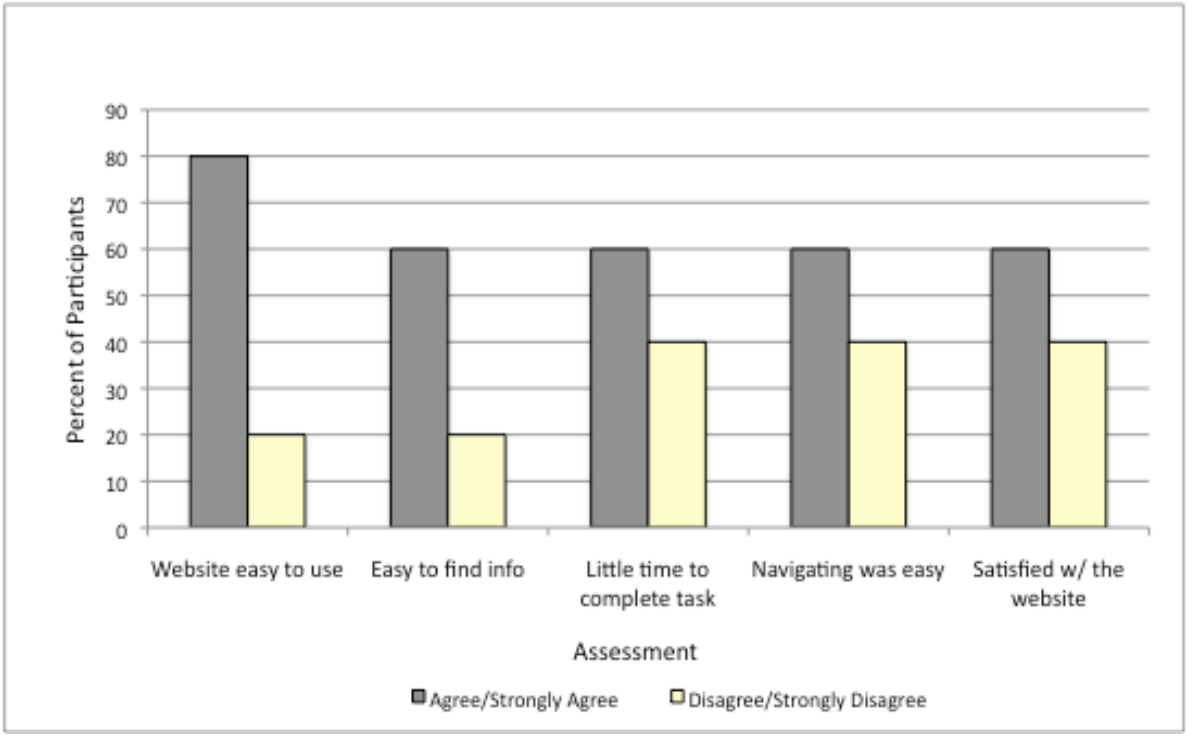

Figure 10. University A – Post-Test assessment.

The Web site was easy to use. For the rating on "The Web site was easy to use," four of the five participants, representing 80%, rated the Web site as easy to use. Although giving a rating of "Agree," one of the four participants made a comment about a task, which is looking of credits, as not being easy to complete.

The fifth participant found the Web site as not easy to use and gave a rating of "Strongly Disagree." The comment made was, "The layout of the links can be improved—the link box should move as you scroll down."

It was easy to find the information I need. Three of the five participants, representing 60%, found it easy to find the information they were looking for. The breakdown of the 60% is 20% for "Strongly Agree" and 40% for "Agree."

One participant disagreed with the easiness in finding the information. The comment made pertained to the layout of the webpage, "The right side was generic. I want specifics for the site I'm looking for."

It took little time to complete each task. A total of 60% of the participants agreed that it took little time to complete to complete each task. However, one of the participants in this group commented, "The longest task was to find the credits."

One of the participants, representing the 40% group, found it took more time to complete each task. The comment made was, "At times it was hard to answer questions since the Web site was so unfamiliar. I just wanted to pick up the phone and call someone."

Navigating through the site content was easy. Sixty percent of the participants found the University A's Web site easy to navigate (20% Strongly Agree and 40%

Agree). There were 40% who encountered difficulty in navigating through the site content. There were no comments submitted by the participants.

I am satisfied with the Web site. Three of the five participants, who comprise 60%, were satisfied with the Web site. One of the three participants, however, commented about dissatisfaction on searching for one particular information, which pertained to the credits.

The remaining two participants were not satisfied with the Web site. The comment made by one of participants alluded to how information was displayed. "Too much text. Need to use bullets and consolidate."

Additional comments. There were additional comments made by the participants. One said, "Too much information." Another participant indicated, "Site has a lot of information on program requirements and Admissions info. There is a lot of info on the pages, which can make it slightly difficult to find the tabs/quick links you are looking for."

All the assessment criteria showed more participants who Agreed/Disagreed making this Web site satisfactory to use.

University B

Figure 11 captures the input provided by the participants for University B.

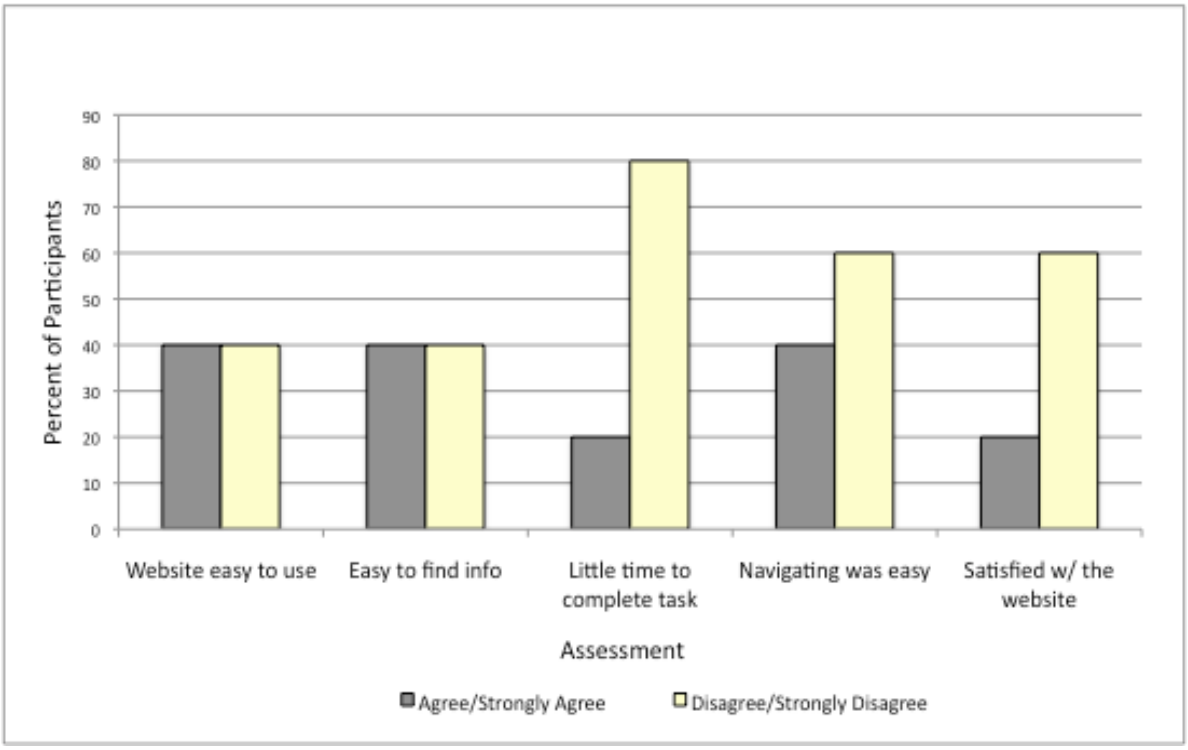

Figure 11. University B – Post-Test assessment.

The Web site was easy to use. There were two participants, to equal 40%, who agreed that the Web site was easy to use. One participant commented, "It is easy to navigate." Two participants found the Web site not easy to use and strongly disagreed." No comment was made regarding why the Web site was not easy to use.

It was easy to find the information I need. Two participants (40% Agree) agreed it was easy to find the information. One of the two, on the other hand, expressed dislike of the content. Two participants did not find it easy to find the information (20% Disagree and 20% Strongly Disagree).

It took little time to complete each task. There was only one participant who found it took little time to complete each task. The four other participants felt it took them more time to complete each task. A participant expressed, "Had to constantly double check to make sure if I'm doing this right and gathering all of the info."

Navigating through the site content was easy. No comment was made in reference to navigation. Forty percent found it easy to navigate through the site. However, 60% expressed difficulty in going about the site.

I am satisfied with the Web site. There was only one participant, equivalent to 20%, who was satisfied with the Web site. This participant offered a suggestion, "They could make some things more obvious." Three participants (20% Disagree and 40% Strongly Disagree) were not satisfied with the Web site. One participant expressed, "I do not like the Financial Aid portion. However, if the program was open to apply and it had the same level of detail as the MBA program would have liked the site."

Additional comments. There were additional comments shared by the participants. One participant gave an insight on how information is presented. "Information layout is terrible and not convenient to readers. Another participant said, "The rates should come up after clicking list. They should also specify if there is a paper app. And clarify that when clicking on Begin Grad School app it will take you to online app."

Three of the five assessment criteria show there are more participants who disagreed about little time to complete the task, navigating was easy and satisfied with the Web site. There was a tie, in terms of percent of participants, on agreeing and disagreeing with the Web site as being easy to use and finding the information was easy.

University C

Figure 12 contains the responses provided by the participants.

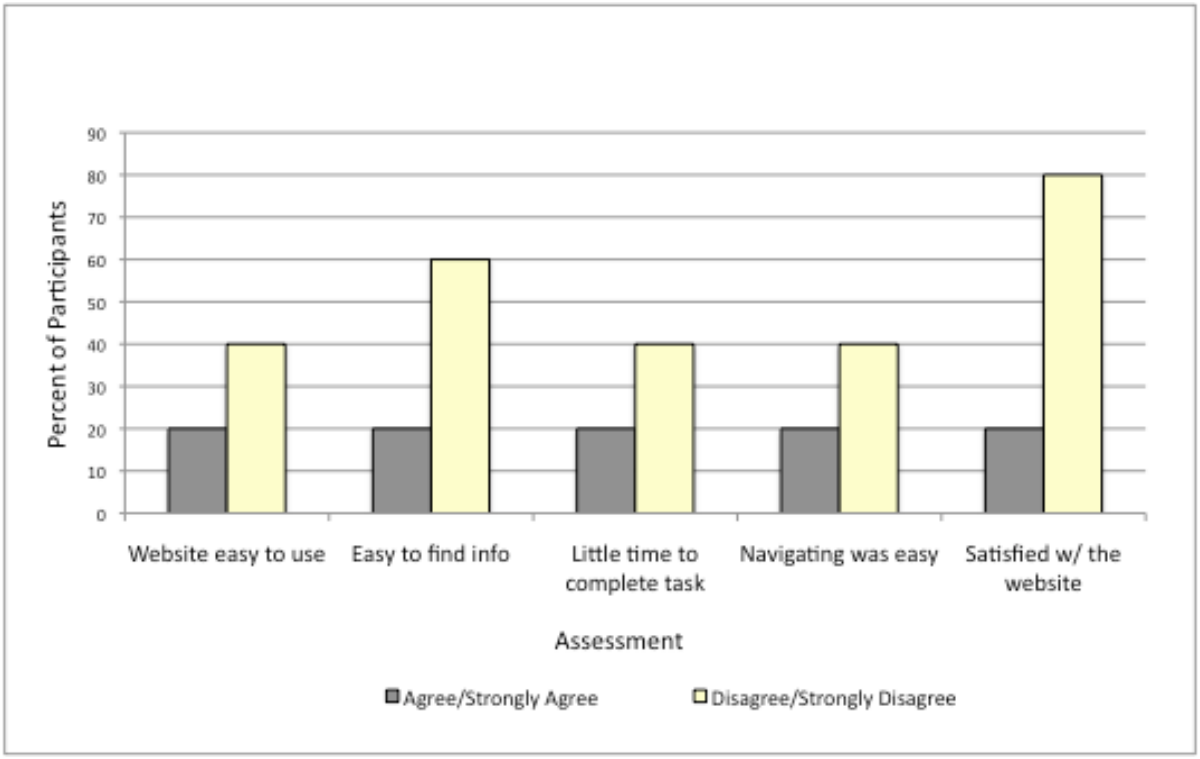

Figure 12. University C – Post-Test assessment.

The Web site was easy to use. There was only participant, equals to 20%, who found the Web site easy to use. This participant shared, "much better structure." Two participants did not agree that the Web site was easy to use. One of these two participants commented, "This site is extremely difficult to navigate."

It was easy to find the information I need. One participant indicated it was easy to find the information. A comment made by this participant was, "Yes – right on the tip of my finger" referring to the information being sought. On the other hand, there were three participants, equals 60%, who disagreed.

It took little time to complete each task. There was only one participant who found it took little time to complete each task. The comment made by this one participant was, "everything was simple." Two participants assessed that it took them more time to complete each task. On commented, "I would have left this site before even finding the degree."

Navigating through the site content was easy. There was only one participant who found navigating through the site content was easy. Two participants did not find it easy to navigate through the site. There was no comment was submitted by the participants.

I am satisfied with the Web site. One participant was satisfied with the Web site. The other four participants, comprising 80%, were not satisfied. One participant thought, "The home page had too many words."

Additional comments. There were a number of comments submitted by the participants. One participant liked the simplicity of the Web site. Two participants were not impressed. "This Web site emphasizes too much about how to apply online as opposed to the detailed programs." The other comment made was, "The site made me go back and forth between sections to find the info I needed. I could not find required courses. I don't believe the site lists that information."

In all of the assessment criteria there were more participants who disagreed making this Web site not satisfactory to use.

University D

Figure 13 is the chart for University D, which reflects the participants' input.

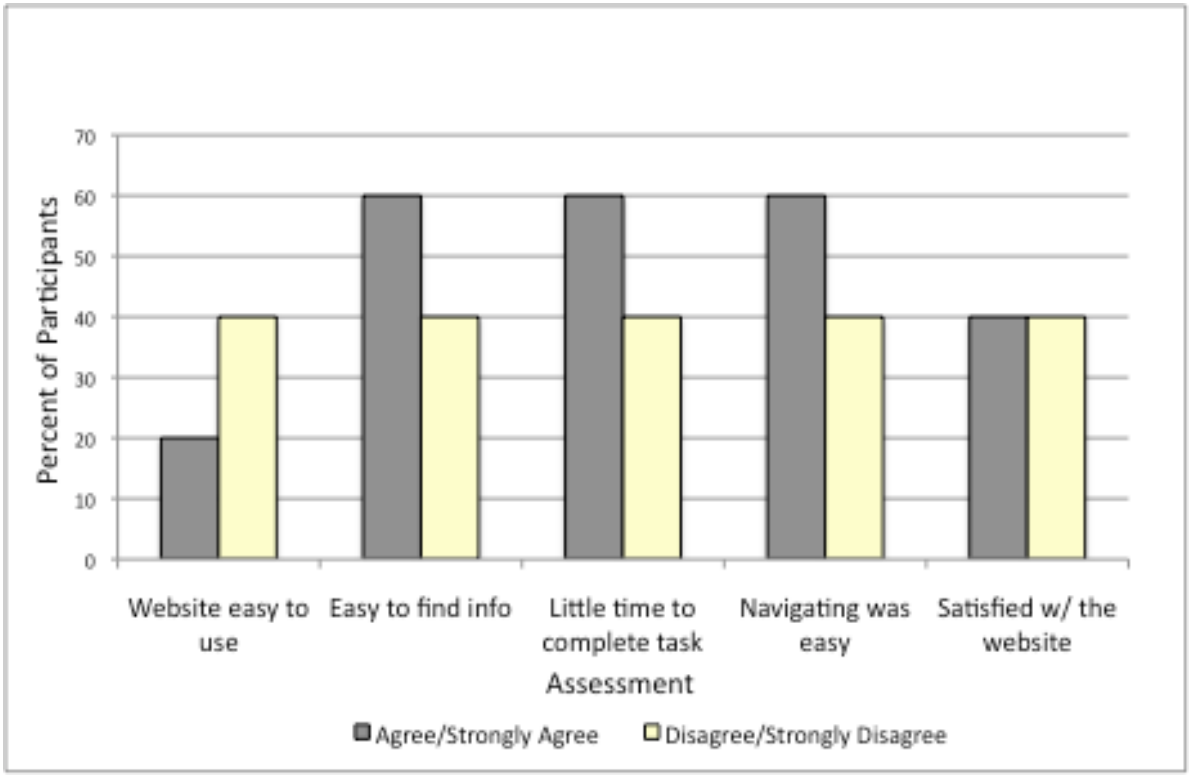

Figure 13. University D – Post-Test assessment.

The Web site was easy to use. There was only one participant who rated the Web site as easy to use. Two participants disagreed about the site's easiness to use. One of the two commented that in some areas like the Financial Aid, it was easy. "For some it wasn't (i.e., finding the actual program). So important info was lacking clarity." The other participant, who strongly disagreed, did not like having multiple windows open up as links where clicked.

It was easy to find the information I need. Sixty percent of the participants (for a total of three) agreed that finding the information was easy. One of the three had a comment to one feature of the site: "Except there is no apparent term 'Admission' for this specific term, instead it says 'Click here for useful information for getting through the program'."

The two participants who found the Web site not easy to use had comments. One said there were information that was easy to find but there were some that were difficult to find alluding to lack of clarity. The other participant said, "Nothing was titled appropriately, so had to click virtually EVERY link."

It took little time to complete each task. Three participants agreed that it took little time to complete each task. Although one of the three felt one task took longer. One of the two testers, again, commented about some were areas were easy but some were not and there was confusion. Another from the same group mentioned one task took longer to complete.

Two participants disagreed and determined it took them longer to complete each task. A comment made was, "Pages loaded slowly. Info was not organized."

Navigating through the site content was easy. Sixty percent of the participants agreed on navigating through the site content was easy. No input from the participants, however, was provided.

The remaining two participants did not find the navigation aspect of the site to be easy. One of the participants said, "The core program I was looking at was hard to find." The other one mentioned, "found program info not under program name but under 'catalog of courses.'"

I am satisfied with the Web site. There were two participants who were satisfied with the Web site and two participants who were not satisfied. One of the dissatisfied participants suggested, "Need to make it easier to use."

Additional comments. There were two comments collected. One was about liking the Web site, "I like that when you went to the program info a lot of info such as Financial Aid, course requirement, admission requirement, etc. were all on the same page." On the contrary, one comments was, "Program page opened a static page with no info and a request for name! Worst site I visited!"

Three of the five assessment criteria illustrate 60% of the participants agreed that it was easy to find information, it took little time to complete the task and navigating within the site was easy. It was a tie with being satisfied in using the Web site with 40% each for Agree/Strongly Agree and Disagree/Strongly Disagree. Regarding if the Web site was easy to use, 40% of the participants disagreed.

Summary of Research Question No. 4

The participants gave an evaluation on the Web site after they performed the tasks. The evaluation reflected how the participants felt about using the different Web sites. The participant went over the assessment criteria to inform whether they agree or disagree. There were five assessment criteria or evaluation points to assess the overall experience. They are: (a) The Web site was easy to use; (b) It was easy to find the information I need; (c) It took little time to complete each task; (d) Navigating through the site content was easy; and (e) I am satisfied with the Web site.

University A turned out to have a Web site that was satisfactory to use because majority of the participants agreed on all the assessment criteria.

University C was not satisfactory to use. There were more participants who disagreed in all the assessment criteria.

The data for University B show that in three assessment criteria there were more participants who disagreed.

For University D, there were more participants who agreed in three of the five assessment criteria.

Other Data

The Tasks Questionnaire was created to collect numerous data from each task. Below are two questions that were asked. Time to Complete asked how long it took to complete the task. Did You Use Web site Aids asked about if Web 2.0 technology (such as Live Chat, Collaborative Help, etc.) were used.

Time to Complete. There was time data collected in the study. However, it was determined that the data would not produce meaningful statistical information. There were participants who gave a number of tasks zero time. This was because the participant already knew the information when it was time to perform the task. A discussion on this can be found in answering Research Question number 2 above.

Did You Use Web site Aids. The Tasks Questionnaire includes questions, which asked about if the Web site tools (e.g., live chat, collaborative help, etc.) were used while completing the tasks. Chat refers to engaging a real-time conversation with a representative of the school to make an inquiry using an instant messaging (IM) type of application. Collaborative help is about offering suggestions to its visitors. Data for this feature is gathered from previous visitor's input. This is similar to how Amazon.com makes suggestions on what to buy if a product is chosen.

The four subject university Web sites, at the time of the testing, did not utilize any Web 2.0 applications, such as live chat, collaborative filtering or social networking. The Web sites were the typical straightforward sites containing navigation features (e.g., links, tabs and buttons to get around the site), some form of graphics, and links to non-Web 2.0 applications, such as the search capability and the ability to apply online. Three of the Web sites used the same window when displaying a new page. One Web site, on many of its links, launched a new window to display information. Therefore, no data was collected in reference to Web site tools.

On the other hand, there were comments shared by a couple of participants regarding live chat as a feature in university Web sites. One test participant commented that the live chat feature would be great for a Web site but added that its hours of operation would be limited to only a set number of hours during the day and not 24 hours. The other test participant had a different point of view. This participant indicated the live chat feature would not be beneficial because the person manning the live chat would only be answering general questions. For this participant, more detailed information is desired and a generalist would not know the answer.

Summary

Research Question No. 1

Research Question No. 1: How did the students rate the level of difficulty in completing each task?

To answer the question, the participants gave a rating on each task that was performed. The overall rating for all the four universities is that more than half of the tasks were Easy/Very Easy to perform.

University A came up with the most number of tasks as being Easy/Very Easy to perform having seven out of eight tasks. Universities B, C, and D each reported as having five out of eight task each as being Easy/Very Easy.

Pertinent information to rating the difficulty were the completion rate of each task and if there was more than one attempt to complete the task. University A has three tasks that were not completed by all of the participants. Five tasks reflect as having more than one attempt to do the task.

For University B, three tasks were not totally completed by the participants. All tasks show there was at least one participant who made more than one attempt in completing the task.

With University C, two tasks were not completed by all of the participants. There were participants who made more than one attempt to complete in all eight tasks.

Only one task in University D was not completed. All other tasks were completed. Five tasks show there were participants who made more than one attempt to complete the task.

Research Question No. 2

Research Question No. 2: What did the students find most helpful in completing the tasks?

There were three classifications generated by the responses provided by the test participants. The classifications are: (a) Clearly Marked/Labeled; (b) Easy to find information; and (c) Helpful navigation aids.

The participants liked how certain elements of the Web pages were clearly marked and labeled. They also liked links that were appropriately labeled. Short and concise statements also helped

The participants indicated that there was ease in finding the information for which they were looking. In some cases, because the participants read the content, they came across information that would be the answer to a succeeding task.

The navigation aids enabled the participants to get to the information they were looking for. Tabs and buttons helped in this process.

Research Question No. 3

Research Question No. 3: What did the students find least helpful in completing the tasks?

Three categories were generated based on responses from the participants. The categories are: (a) content presentation; (b) information structure; and (c) navigation.

Content presentation is about the visual perception of the participants on the Web pages. Content refers to, but is not limited to, text, tabs, links, and menu and how all these are arranged in the Web page.

Information structure refers to the organization of information within the Web site. The information could be present in the Web site but the user is having difficulty in finding it. Or there could be expectation for the data to be present but is missing.

Navigation is the mechanism, which facilitates in movement from one part of the Web site to another to get to the page where the information being sought is located. Navigation uses links, tabs, and buttons. Too many clicks to arrive at the destination is not favored.

Research Question No. 4

Research Question No. 4: How satisfied are the students in using the Web site?

An evaluation was conducted after the list of tasks was performed. The evaluation was not on a task level but on the participants' total experience in using the Web site. There were five evaluation points to assess the overall experience. They are (a) The Web site was easy to use; (b) It was easy to find the information I need; (c) It took little time to complete each task; (d) Navigating through the site content was easy; and (e) I am satisfied with the Web site. The participants were asked to either agree or disagree.

University A reports that there were more participants who agreed with all assessment criteria (a.k.a. evaluation points). This equates to majority of the participants were satisfied with the Web site.

In University B, participants disagreed in three assessment criteria indicating that overall experience with this Web site was not satisfactory.

For University C, there were more participants who disagreed in all the evaluation points. From the participants' standpoint, experience in using the Web site was negative.

There were more participants (60%) who agreed on three assessment criteria. Forty percent of the participants disagreed on all assessment criteria.

Chapter 5: Conclusion and Recommendations for the Future

Overview

The use of Web sites is an integral part of our daily activities. We visit Web sites for a reason, which is to accomplish a goal. The goal could be to look for information, read the news, check e-mail, chat, log in to a social network site, or perform banking functions, such as view account balance, pay bills, and transfer funds. The use of each Web site brings a different experience to the online user. The success of using a Web site is dependent on the user experience, which is driven by the quality of the interaction imparted by the Web site to the user.

Educational institutions utilize Web sites to have presence in the Internet in order to make available information about their programs and courses. Prospective students no longer have to physically visit the institution's campus to obtain information. All they need to do is go to the university's Web site. The Web site is the medium to disseminate the information. How effective the Web site is remains to be seen. It is possible that the prospective student was challenged during the process of locating information thereby decreasing the quality of interaction and yielding to a negative experience.

Restatement of the Research Questions

Below are the research questions of this study.

1. How did the students rate the level of difficulty in completing each task?
2. What did the students find most helpful in completing the tasks?
3. What did the students find least helpful in completing the tasks?
4. How satisfied are the students in using the Web site?

Conclusion

Research Question No. 1

The study's participants performed a list of tasks. After each task, the participants rated the level of difficulty. The data collected showed that task level ratings per Web site were different. There were tasks that were easy to perform, where the information being sought was easily found. These tasks were rated as either Easy or Very Easy, thus producing a positive user experience. As an example, for University A, there were seven out of eight tasks that were rated by at least 60% of the participants as being Easy/Very Easy. As for Universities B, C, and D, each had five out of eight tasks rated as being Easy/Very Easy by at least 60% of the participants.

There were tasks that were harder to accomplish. This produced a negative experience due to the poor quality of interaction and thus earning a Difficult/Very Difficult rating as evidenced by some comments made by the participants: "Very difficult to find information - frustrating"; "Can't find the information"; and "Had to dig to get this info and still confusing.

The study showed that the quality of interaction or user experience in performing each task is unique. A Web site is considered a self-service product. As an online user visits a Web site, there are no instructions on how to conduct activities in the site. The user is left on her own and relying only on previous experience to guide her in using the site. The use of each site offers a different experience (Garrett, 2003). The quality of the interaction with the Web product dictates the user experience (Garrett, 2003).

Cooper and Reimann (2003) point out that user experience cannot be designed. However, it is the behavior of the product (e.g., a Web site) that can be designed. User

experience only comes after the user has interacted with the product or system. Businesses are aware of the importance of providing excellent user experience. This determines whether or not the user will come back to the site (Dustin, Rashka, & McDiarmid, 2002; Garrett, 2003).

Research Question No. 2

Research Question No. 2 is about what the participants found most helpful in completing the tasks. From the data collected, three classifications on what was deemed helpful by the participants in executing the tasks were determined. The three classifications are: (a) clearly marked/labeled; (b) easy to find information; and (c) helpful navigation aid.

The study indicated that the visual design of the web pages contributed to ease of use of the Web site. Good visuals have an instantaneous emotional impact (Norman, 2004). The layout of the Web page; the presentation of information; banner at the top of the page; hyperlinks; and short, accurate statements made it easy for the participants to find the information they were looking for.

In Norman's (2004) conceptual models, the designer has an idea, called the designer's conceptual model, on what the product should be and therefore creates the product according to what he has in mind. The product once created, projects an image (referred to as the system image) to the would-be user. On the other hand, the user has an interpretation (known as the user's mental model) on how the product should be and how it works. The user will use the product based on its appearance, the manner it operates and he feedback it provides. To have a product that will be useful to the user, the designer's conceptual model must equal the user's mental model (Norman, 2004).

While the participants performed the tasks, there were instances, indicated by the participants' responses, that what the designer had in mind was also what the user had in mind. There was input about how helpful it was to have the same type of information in the same page. The comment was, "Financial aid was in the same page as tuition." Since the same type of information was grouped together, the user did not have to look for the other information elsewhere. Also related to how information was displayed, another response was, "Very nice – I like the structure, clear."

In terms of navigation aids, the user's expectation (i.e., the designer's conceptual model equaled the user's mental model) was also met when a feature was provided for easy access to information. Here is a comment that was made, "Having a financial aid button on all the pages is very helpful."

A finding in this study was the participants' ability to remember the information they came across while browsing the Web pages. This was evident from the responses provided, e.g., "Already saw this"; "Very easy - mentioned in first paragraph"; and "Yes, saw before." The participants' input referred to when a task was performed. The participant did not have to look for the information because it was already seen while completing a previous task. The participant remembered reading the information. Another development in regards to this is monitoring the time to complete the task. Since the information being sought for the task was already known then the time to complete equals zero. The "Time to Complete" data was not used in any statistical computation because of this.

Research Question No. 3

In answering Research Question No. 3, about what the students found least helpful in completing the tasks, there were three categories relating to issues encountered by the participants. The categories were: (a) content presentation; (b) information structure; and (c) navigation. All universities (A, B, C, and D) had at least one participant (or 20%) who experienced an issue in each category.

There were a number of issues brought up in the content presentation category. This category is about how the content of the web page communicates with the online user. It is how the user visually perceives what is presented in front of her.

There was the confusion about having the menus on both the left and right sides of the screen. There was also mention that it would have been easier to have the content displayed in bullet format rather than in paragraph form. These examples point to issues on the visual design of the product and contrary to a visually appealing product. According to Hoffman and Krauss (2004), visual aesthetics, being an effective communication tool, influences the perceptions of the viewer. Krauss (as cited in Hoffman and Krauss) made a point, "The aim of visual aesthetics is to induce the user unknowingly, unconsciously, and unsuspectingly choose to become involved in the message and the Web site of concern" (p. 205).

The other issues brought up in content presentation, such as "too wordy" and "a lot of text to go through", concur with how online users behave. Online users are in a hurry and do not want to spend more time than they have to (Krug, 2006). McGovern and Norton (2002) pointed out a Sun Microsystems study where 79% of Web users scan read.

Web users do not have the patience to go through a lot of content, especially if they are searching for information.

Norman's (2004) conceptual models are applicable to Web products, such as a Web site. It is important that the model formed in the designer's mind must equal the model created n the user's mind (Norman, 2004). The study showed there is a disconnect between the user and designer's model. A designer may have a number of reasons for putting information so many levels down in the Web site. Getting to the information takes four clicks (i.e., the behavior of the product which is what the designer had in mind) as mentioned by one of the participants. For the user, it is imperative to find information right away. Four clicks equate to going through a number of pages (i.e., the navigation aspect), which is unacceptable from the user's point of view (i.e., the user's mental model).

Another area where there was a mismatch on the designer's conceptual model versus the user's mental model is on what information to display (i.e., the information structure). For the designer, it is enough to display the list of courses. However, for the user, additional information such as the total credits is needed. The total credits can be derived by a simple computation. However, the user does not want to perform any calculation. Displaying the total number of credits is what the user has in mind.

Research Question No. 4

In answering Research Question No. 4, about how satisfied the students were in using the Web site, the participants responded to the question in the Post Task Questionnaire after performing the list of tasks. Answering the questionnaire gave the participants an opportunity to reflect on their overall experience, not on a task level, and

express their satisfaction on using the Web site. The participants were asked to agree or disagree on the five evaluation points.

Similar to Research Question 1 above, the data collected in answering Research Question 4 revealed the importance of the user experience, which is the quality of interaction between the participants and the Web site. For Universities A and D, majority of the participants found the respective Web sites satisfactory to use. With Universities B and C, the overall experience of the participants in using the Web sites was negative.

The study also unveiled an interesting outcome between the task level user experience and the overall user experience. One would think that if the feedback provided on the task level was positive, i.e., having a rating of Easy/Very Easy, then the overall experience was also positive. However, this was not true for University B and University C.

The task level results indicated five out of the eight tasks for University B were rated as Easy/Very Easy by at least 60% of the participants. On the Post Task assessment, there were three out of the five areas of assessment that showed at least 60% of the participants disagreed with the Web site as being either taking less time to complete the task, navigation was easy, and satisfaction with the Web site. Therefore, the overall experience in using University B's Web site was not satisfactory.

With University C, at least 60% of the participants rated the task as Easy/Very Easy on five out of the eight tasks. The Post Task assessment indicated that at least 40% of the participants responded negatively in all the five areas of assessment: The Web site was easy to use, it was easy to find information, it took less time to complete the task,

navigating was easy, and I am satisfied with the Web site. The overall user experience of University C's Web site was negative.

As mentioned in Research Question 1, user experience cannot be designed because it only takes place after interacting with the product. However, the product's (e.g., a Web site) behavior can be designed (Cooper & Reimann, 2003). It is, therefore, imperative to ensure that the product's behavior meets the expectations of its users to have a positive user experience.

The difference between Research Question 1 and Research Question 4 is that one was measured on the task level (Research Question 1) and the other (Research Question 4) was after performing all the tasks, which was from an overall experience standpoint. A discussion with a usability expert about the difference in results indicated that with Research Question 1 (task level), the evaluation was on the performance of the participant in completing each task. The usability expert added that participants would normally feel that if it is on a task level, it is their competence that is being measured. With Research Question 4 (overall experience), according to the usability expert, the Web site is the one being assessed from the participant's point of view.

Recommendations for the Future

The purpose of the study was to explore on the different factors that contribute to the usability of university Web sites. There is still a need to better understand what the user's needs and expectations are when they visit a Web site. The discussion of the four research questions in the conclusion section above identified areas for improvement in making university Web sites more usable. The areas for improvement are:

1. User Experience – from Research Questions 1 and 4

2. Visual Design – from Research Question 3
3. User Online Behavior – from Research Question 3
4. Conceptual Models – from Research Question 4

User Experience

There was difficulty encountered while performing many of the tasks in each of the university Web site. These hardships in completing the tasks equated to negative user experience. User experience must be improved. To elaborate on user experience, "Forrester defines user experience as: Users' perceptions of the usefulness, usability, and desirability of a Web application based upon the sum of all their direct and indirect interactions with it" (Gualtieri et al., 2009, p. 2). There is a solution to attain positive user experience. According to Gualtieri et al., the following are elements that characterize great user experience:

1. Useful – This is about the goal of the user being achieved when a Web site is visited. The Web site will be gauged as useful if the goal was attained. The goal can be as simple as checking e-mail.
2. Usable – This pertains to how easily the tasks are achieved. The user may be able to find the product that is being purchased, which would make the site useful but if there are too clicks to get through the payment process then there is a usability issue.
3. Desirable – This is about the Web site being able to capture the emotion of the visitor through the use of pleasing visuals and appropriate content.

Visual Design

There was feedback about having menus being on the left and right sides, the page was too busy, and how the participant preferred to have the list of information presented in bullet format rather than in a paragraph. All these refer to the visual design of the Web pages. In 2004, according to Hoffman and Krauss, Van def Heijden (2003) established attractiveness as a contributing factor to ease of use, enjoyment, and usefulness. The Web pages must be visually appealing and not confuse the user. The Web pages call for a good layout and presentation of information.

Designing for the web entails deeper involvement because of interactivity and information layering (Goto & Cotler, 2004). Oftentimes, designers get carried away with their work and forget about the users. Visual designers are reminded to design for the target audience and not for themselves (Goto & Cotler, 2004).

User Online Behavior

There was feedback about web pages being "too wordy", "too much writing", and too much text. Online users do not read word for word. They scan read, which means the participants browse over the material. Online users only want to see material that is relevant (McGovern & Norton, 2002). There is no need to read everything. Web users only look for pieces of information that match their interest or task at hand (Krug, 2006).

The content being presented should not be confusing to the online user. Here is a suggestion made by McGovern and Norton (2002), "If you want to communicate with your reader, start off by writing in a language that does not confuse them. Write simply. Write directly. Write concisely. Remember, your reader is in a hurry. Get to the point" (p. 55).

Conceptual Models

Norman (2004) mentioned about the three models involved in developing a product: (a) the designer's conceptual model—this is what the designer has in mind on that the product is supposed to be; (b) the system image, this is what the designer created; (c) the user's model—this is what the user has in mind and the interpretation on how the product works and behaves. Oftentimes, when a product is being developed, there is no communication that takes place between designer and the user (Norman, 2004). The only communication is done through the product (Norman, 2004). There is a need to decrease the gap that exists in the user's mental model and the designer's conceptual model.

One way to reduce the gap between the designer and the user's model is to involve the user during the development of the product. As the product is designed and coded, the user is able to provide input. If there are issues the product can be redesigned. After the redesign, the user tests the product again. This becomes an iterative process until the product receives the approval of the user (Cooper & Reimann, 2003).

If the user is put in the center of designing a product, then, the designer will understand who the users are and what the tasks are. Gould and Lewis (1985) explain, "The understanding is arrived at part by directly studying their cognitive, behavioral, anthropometric, and attitudinal characteristics, and in part by studying the nature of the work expected to be accomplished" (p. 300).

Once there is an understanding on the user's needs and expectations, designing the other elements of the Web site will follow. There will be the sound and logical organization of information (i.e., information architecture) and a useful mechanism (i.e., navigation system) to retrieve information.

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Appendix A

Tasks Questionnaire

Tasks Questionnaire

University Website URL: _____

Task No.	Task Description	Time to Complete	Rate the Difficulty* (Enter the No.)	Did you complete the task? (Yes/No)	Did the task require more than one attempt to complete? (Yes/No)	Did you use website aids (e.g., chat, collaborative help, etc.) to complete the task? (Yes/No)	Which website aid (e.g., chat, collaborative help, etc.) did you use?	How would you rate the website aid(s)**?
1	Go the university's website and determine if there are graduate programs (Master's) related to Educational Leadership/Administration.							
	Comments:							
2	Is the program offered online?							
	Comments:							
3	What are the admission requirements for the program?							
	Comments:							
4	How many credits are required to finish the program?							
	Comments:							
5	Does the website identify the required classes?							
	Comments:							
6	Does the websie identify tuition rates?							
	Comments:							
7	Is financial aid available?							
	Comments:							
8	Can prospective students apply for the program online?							
	Comments:							

* Rate the Difficulty (Please select number)

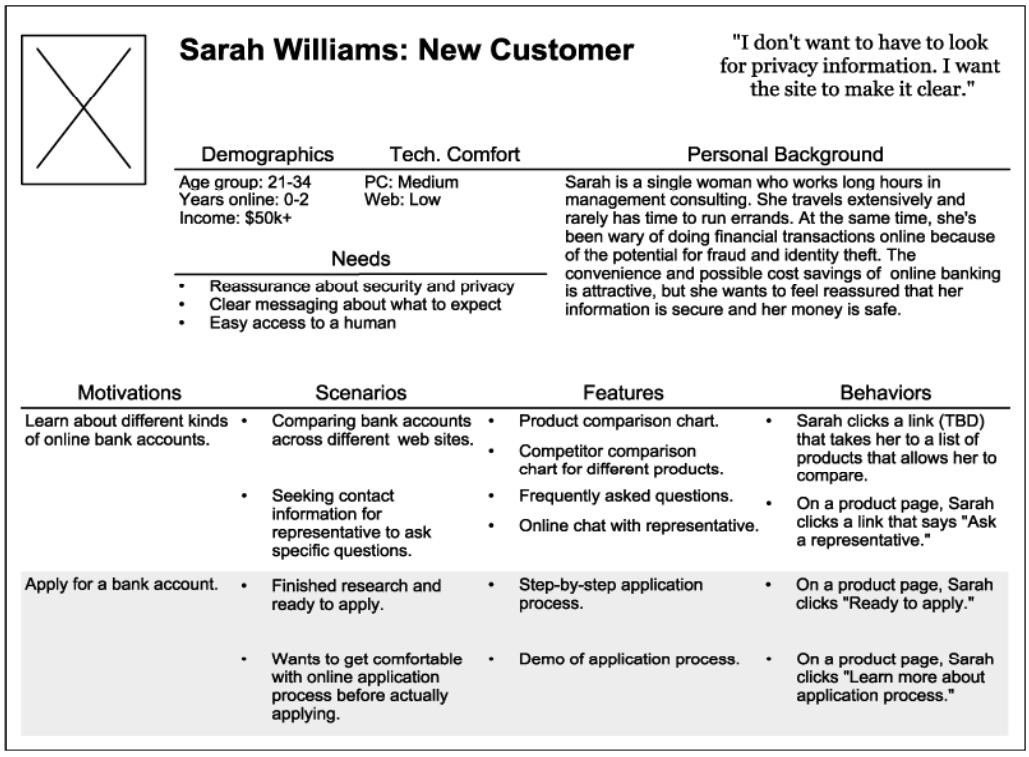
Very Easy	Easy	Neutral	Difficult	Very Difficult
1	2	3	4	5

** Rate the website aids (Please select number)

Very good	Good	Fair	Poor	Very Poor
1	2	3	4	5

Appendix B

Detailed Persona of a Bank's New Online Customer



Sarah Williams: New Customer

"I don't want to have to look for privacy information. I want the site to make it clear."

Demographics	Tech. Comfort	Personal Background
Age group: 21-34 Years online: 0-2 Income: $50k+	PC: Medium Web: Low	Sarah is a single woman who works long hours in management consulting. She travels extensively and rarely has time to run errands. At the same time, she's been wary of doing financial transactions online because of the potential for fraud and identity theft. The convenience and possible cost savings of online banking is attractive, but she wants to feel reassured that her information is secure and her money is safe.

Needs

- Reassurance about security and privacy
- Clear messaging about what to expect
- Easy access to a human

Motivations	Scenarios	Features	Behaviors
Learn about different kinds of online bank accounts.	• Comparing bank accounts across different web sites.	• Product comparison chart. • Competitor comparison chart for different products.	• Sarah clicks a link (TBD) that takes her to a list of products that allows her to compare.
	• Seeking contact information for representative to ask specific questions.	• Frequently asked questions. • Online chat with representative.	• On a product page, Sarah clicks a link that says "Ask a representative."
Apply for a bank account.	• Finished research and ready to apply.	• Step-by-step application process.	• On a product page, Sarah clicks "Ready to apply."
	• Wants to get comfortable with online application process before actually applying.	• Demo of application process.	• On a product page, Sarah clicks "Learn more about application process."

Appendix C

Participant Questionnaire

Participant Questionnaire

Please answer the following questions. Put a checkmark next to your answer, where applicable.

1. Not including Internet use, do you use a computer to perform tasks, e.g., create documents, spreadsheets, or presentations, send email, etc.?

   Answer: Yes ____ No ____

   If Yes, how many hours per week?

   ___ 1 - 5 hours ___ 6 – 10 hours ___ 11 – 20 hours ___ 21 - 40 hours ___ more than 40 hours

2. Do you use the Web/Internet?

   Answer: Yes ____ No ____

   If “Yes”, how long have you been using the Web/Internet?

   ___ 1 - 5 years ___ 6 – 10 years ___ 11 - 15 years ___ 16 - 20 years ___ more than 20 years

   If “Yes”, how much time per week?

   ___ 1 - 5 hours ___ 6 – 10 hours ___ 11 – 20 hours ___ 21 - 40 hours ___ more than 40 hours

   If “Yes”, what do you use the Web/Internet for (check where applicable)

   Find Information ____ Shop ____ Entertainment/Gaming ____ News _____
   Online banking ____ Pay bills ____ Social Networking (Facebook, MySpace, Twitter, etc) _____

   Other (please specify) _____

Appendix D

Post-Test Questionnaire

Post-Test Questionnaire

(Please put a circle on your answer)

1. The Web site was easy to use

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

2. It was easy to find the information I need

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

3. It took little time to complete each task

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

4. Navigating through the site content was easy

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

5. Website aids were easy to use (Note: State “N/A” in Comments if not applicable.)

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

6. I am satisfied with the website

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5

Comments: _____

7. Additional comments: _____

_____

_____

Appendix E

Scripts

Introduction Speech – The following is the introduction speech, which will be read aloud to the human subject on the day of the usability evaluation prior to giving out the instructions on what needs to be done. For each participant, the script will be read verbatim for consistency in expressing the same thought.

---------- Start of Introduction script ----------

Good morning (or Good afternoon). Thank you for coming today. Your participation in this study is much appreciated. I would like to point out that this study is about an evaluation of four university Web sites in terms of usability. The study is not about your computer skills. There is no reason to be worried about. We use computers on a regular basis. We are familiar with how computers and the Internet work.

I will be going over the Task Questionnaire shortly. There will be a number of tasks that you will be asked to complete. These tasks are the same for each of the university Web site that will be evaluated. If you encounter any positive or negative experience while completing any of the tasks, please feel free to state what you are thinking or feeling aloud. Let's say if you feel the task is easy to do, you might say, "Oh this is easy. I am able to find the information right away." Or you might say, "The screen layout is helpful in finding the information. On the other hand, you may be experiencing difficulty. You might say, "This is confusing to use. I can't find what I am looking for."

It is important to note that you have the right to decline participation in this study. If at any point you wish to stop participating and leave, you may do so. This will not be taken against you.

Do you have any questions at this point?

Also, at any point, if you feel there is a need to take a break, please let me know and we will stop the evaluation process.

Before we go over Tasks Questionnaire, I would like to ask you to fill out **Participant Questionnaire**. This survey is about computer and Web usage. The survey is not about your computer skills.

---------- End of Introduction script ----------

I give out the questionnaire to the participant and allow some time to answer. The questionnaire will be retrieved. Then, the Tasks Questionnaire will be handed out.

Tasks Questionnaire - The script below documents the procedure in filling out the Tasks Questionnaire. The human subjects will use one hardcopy of the Tasks Questionnaire per Web site. The URL (Uniform Resource Locator) of the university Web site will be placed at the top of the Tasks Questionnaire.

---------- Start of Tasks Questionnaire script ----------

Here is the Tasks Questionnaire (researcher hands out the document). The left side of the questionnaire lists the different tasks you are requested to complete. There are a total of 12 tasks. The tasks simulate a user going out to the Web to look for information. In this case, the user is looking for information about a graduate program in Education with focus on leadership/administration (See Task No. 1).

While working on each task, there are questions to be answered. Let me elaborate. And, if, at any point, you have a question, please let me know.

1. Time to complete: Take note of the time you started the task and the time you ended the task. Use the clock on the computer.

2. Rate the Task: Use the scale at the bottom of the questionnaire called Rate the Tasks as a guide to provide a rating.

3. Did you complete the Task: Completing the task means you successfully found the information. Answer with either a "Yes" or "No."

4. Did you complete in more than 1 attempt: Were there multiple attempts made prior to completing the task? Answer with either a "Yes" or "No."

5. Were there Web site aids (e.g., chat, collaborative help, etc.) available to help you get the question answered: There are Web sites that offer help to its users. Some offer online chat. This is where the user can engage in a conversation with a representative of the Web site visited to ask questions. This feature becomes convenient when there is difficulty in using the Web site, e.g., the information cannot be found. Another Web site aid is collaborative help. This is where the Web site has gathered information based on input from previous Web site visitors. An example of this is when the Web site gives "suggestions" to users. A popular Web site using this aid is amazon.com. Amazon suggests additional items customers have bought aside from the item being considered for purchase.

   Does this make sense? Do you have any questions?

   Answer with either a "Yes" or No."

6. Which Web site aid (e.g., chat, collaborative help, etc.) did you use: Identify the Web site aid that was used, if applicable.

7. How would you rate the Web site aid(s): This is where the Web site aid is rated, if applicable. Look at the bottom of the questionnaire for the rating guide on Web site aids.

8. Comments: Enter any comments or suggestions here. This is an opportunity to be heard. You will be helping to improve this Web site.

---------- End of Tasks Questionnaire script ----------

PostTest Questionnaire – Below is the script for the PostTest Questionnaire.

---------- Start of PostTest Questionnaire script ----------

The last questionnaire to fill out is the PostTest Questionnaire. This questionnaire will be filled out after the Tasks Questionnaire. The PostTest Questionnaire is about your overall experience and satisfaction using the particular university Web site. The questionnaire also asks for any additional comments you may have. Remember, by writing down your comments, you are helping this study. Feel free to write anything.

---------- End of PostTest Questionnaire script ----------

Thank you – Below is the script thanking the participant.

---------- Start of Thank You script ----------

Well, this is the end of the session. Do you have any questions? (pause) I am very grateful for your participation in this study. Thank you very much. In token of my appreciation, I would like you to have these two movie tickets. (hands over the tickets) Again, thank you.

---------- End of Thank You script ----------

Appendix F

Permission from D. A. Norman on Conceptual Models

Reply Reply to all Forward | Close | Help

You forwarded this message on 3/9/2009 10:05 AM.
Attachments can contain viruses that may harm your computer. Attachments may not display correctly.

From: Don Norman [don@jnd.org] Sent: Sat 1/17/2009 3:27 PM

To: Bautista, Jesus (student); norman@nngroup.com

Cc:

Subject: RE: Permission to Use Figure/Image

Attachments: Conceptual models system image.png(128KB)

View As Web Page

Jesus

Permission granted. I attach a better copy of the image. Please credit it as follows:

(Originally published in Norman & Draper's User Centered System Design (1986), and reused frequently thereafter: The Design of Everyday Things (1988, 2003) and Emotional Design (2004).

Good luck with your dissertation

Don

Donald A. Norman
Nielsen Norman Group

norman@nngroup.com

Breed Professor of Design, Northwestern University

Co-Director MMM Program. MBA + MEM: Operations+Design
Co-Director Segal Design Institute
norman@northwestern.edu

http://jnd.org/

From: Bautista, Jesus (student) [mailto:Jesus.E.Bautista@pepperdine.edu]
Sent: Saturday, January 17, 2009 2:29 PM
To: norman@nngroup.com
Cc: Bautista, Jesus (student)
Subject: Permission to Use Figure/Image

Dear Mr. Donald A. Norman,

I am a doctoral student at Pepperdine University. I am currently working on my dissertation. One of my references is your book entitled Emotional Design. There is a figure on page 76 called "Figure 3.4 The designer's model, the system image, and the user's model." This figure is also found as a color image, called Conceptual Models, at this website: http://www.jnd.org/dn.mss/design_as_comun.html

I would like to ask permission to use the above-mentioned image, from the website, in my paper. The figure will be used to illustrate conceptual models. The image will be used as is with no modifications. Please advise.

Thank you for your kind attention on this matter.

Respectfully,

Jesus Bautista

Appendix G

Permission from Pearson on Detailed Persona

Your Reference: Updated Permission Request

Div 0T: Code: 9780321392350

Req No 33319: Cust No: 14072

Date: JUN 1 09

Jesus Bautista

Student at Pepperdine University

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