Web Site Design using Participatory Design Methods

Kristin Caufield

Southern Illinois University Edwardsville

Abstract

The effort described in this paper is a project designed to partially fulfill requirements from National Science Foundation Grant #9981088 "Human-Computer Interaction Software Design Curriculum Using Participatory Design Methods," awarded to Dr. Jerry Weinberg. The goal of the project is the creation of an accessible hypertext markup language (HTML) tutorial for educators wishing to incorporate usability and Participatory Design (PD) methods into a Human Computer Interaction (HCI) course. A portion of the project also involved developing a web page for Southern Illinois University, Edwardsville (SIUE) computer science (CS) students to access course materials. All areas of the site were developed using PD techniques. The pages were then tested for compatibility with multiple browsers, across platforms, and on equipment used by people with disabilities.

Web Site Design using Participatory Design Methods

Project Background

In the last decade, the field of computer science (CS) has developed rapidly. During this time, there has been a shortage of human-computer interaction (HCI) information available to those developing CS educational programs across the country (Hewett, 1996). To increase information availability, Dr. Jerry Weinberg received the grant, "Human-Computer Interaction Software Design Curriculum Using Participatory Design Methods," (#9981088) from the National Science Foundation. In this grant, he proposed to create a tutorial to educate instructors interested in developing a HCI course at their institution.

The objective of this project is to provide educators with information on how to create a workable HCI course based around the principles of Participatory Design (PD), a methodology that directly involves end users in product development. Included in this tutorial is information about why one would implement a course using this method, instructions and examples of materials used in an HCI course, and information on the creation of a usability laboratory on a limited budget. There is also a publications section discussing the theory behind the curriculum's development.

The tutorial was originally going to be presented in video format; however, many limitations using this media were discovered – such as the inability to access text or to keep the available information current. After some deliberation, Hyper Text Markup Language (HTML) was chosen as it not only resolved these issues, but the platform was more versatile. For instance, its flexibility facilitates a multimedia environment (e.g. movies, text, sound and pictures) allowing a broader range of material to be presented. Furthermore, this environment supports usability by focusing on the needs and differences of the user, providing them with the option to choose what they would like to

see, how they would like to see it, the order that they want to see it in, and when they wish to view it. Also, as HTML is accessible using any computer operating system, the Internet, CD-ROMs or other storage devices, it enables more effective dissemination. Also, for those who have Internet access, they may view the website developed for the Southern Illinois University, Edwardsville (SIUE) CS students. This allows interested individuals to watch how the course progresses throughout the semester. Finally, this format can be created to conform to the June 2002 Americans with Disabilities Act section 508 accessibility requirements.

Why use Participatory Design?

Despite a designer's and programmer's best effort, Internet sites are frequently difficult to operate. Users often discover that they cannot find the information they seek or they become disoriented when navigating though the disconnected plethora of links appropriately called the World Wide Web.

Why is this the case? It is because the designers and programmers are not the end users and do not necessarily share the same mental models of how a site should be organized and operated; in other words, the different groups' perceptions and concepts of how things "should be" can be very different from one to another. Though program designers may have valid reasons for fashioning a site in a certain manner, these may not be very accurate or representative of what the end users expect. As these individuals are not naïve to the design process nor the project they are working on, they view interaction with the site from a different level, and their intimate involvement provides them with information which the users may not be aware. Conversely, they may be ignorant of the true tasks that the users want to accomplish. For instance, a programmer builds a web site that allows operators to check their e-mail; however, the end users also need to reply to the messages in order to complete their task. Designers may also concentrate on things

that are of their own interests rather than that of the user – such as a graphic designer wanting to make a site unique and expressive, or a programmer focusing on using cutting edge technology and how the system will work. Additionally the designer may, and often is, given the task of designing an interface *after* the program is coded, and thus after most of the major organizational and functionality decisions have been made. Mandel (1997) eloquently calls this "putting lipstick on a bulldog" – that is you can't make an ugly program usable via its interface and graphics. At this stage it is difficult if not impossible to make the program what the user wants or needs. It's like asking an architect to design a building after the construction crew has built it. Consequently, the user is either stuck using an inadequate product or shelves it and continues using their old, more familiar method.

The reader may be aware of guidelines and standards for creating interfaces, (e.g. McKay, 1999; Smith & Mosier, 1996; Apple Computer, 1993) and wonder why these could not employed to fashion a usable product. The problem with guidelines is that they are not designed to address specific users, their clients, and the organization that the product will end up being used in. Therefore it is rare, if ever the case, that they alone can produce an adequate product. In fact, guidelines are purposely vague so they can be applied to many different situations.

Participatory design (PD) is a method that was created to address these shortcomings in developing usable software. PD was developed in Scandinavia during the 1980's as an offshoot of the democratic movement of the 1960's and 70's, which favored improving social factors in the workplace. PD promotes program design by enhancing the ability of people to complete their tasks though involving the users directly as co-developers in the design of the product they will be using (Allen et al., 2001; Jones, P., 1997).

Project usability techniques

There is a variety of perspectives on how to implement PD, such as User Centered Design and Contextual Inquiry; however all methods agree that the end user needs to be considered in the design process. The main difference lies in who is involved and at what stages (Muller, Wildman & White, 1993). Regardless of technique, incorporation of user feedback becomes essential for helping the designer understand the users' needs and identify where they are having problems with the software. Thus, our HCI website was developed using PD methods. To insure that the both the educators and learners were acquiring information they needed without becoming disoriented, approaches from these methods – specifically card sorting, paper prototyping, survey and expert evaluation techniques – were used to guide the design of the layout, navigation, content, and overall look and feel.

Card sorting is a technique that uses note cards to explore how users group items. This method allows the researcher to understand the needs and wants of the end-user, and to envision the mental model the users have for how the information and links should be organized. As this process increases the probability of users being able to find the items they seek (Fuclla, 1997; Grant, 2001; Grant 2002), it was used to develop the overall structure of the website.

Paper prototyping is an iterative technique that uses office supplies, such as paper and sticky notes, to create an easily modifiable mock up of the GUI. This procedure finds usability breakdowns, permits cooperative design between the user and the investigator and constrains the focus to navigation and organizational issues rather than graphical design details (such as not liking a color or choice of font). This is facilitated by the nature of the material – paper invites change, making the user less inhibited in asking the researcher to "fix" problems. With paper it is easy to make modifications on the fly and,

as the researcher is talking to the users in their own language, it permits them to see what might have been left out of a process (Beyer & Holtzblatt, 1998). As participants from the target population were readily available, this method was used for the Student Site.

A usability survey is a list of questions designed to gather information about the users' experiences using a version of the actual product. This method was chosen for the Educator Site over a paper prototype for several reasons. First, as the target population is anyone who wishes to teach an HCI course, a questionnaire could attain a more accurate sampling than could have been obtained locally. Second, the nature of the Educator web site was very different than that of the Student Site. People visiting the site were not there to complete a specific task, but to browse, explore, and read though articles. Thus, creating a set of scenarios would be too restrictive and would not allow the researcher to see how users truly operate.

Methods

Student Site

Participants:

Research by Neilson (1993), and Virizi (1992) found that collecting data from 3-5 people revealed 80% of usability problems – the worst being discovered by the first few users. Employing these guidelines, a total of ten student volunteers were recruited from the Southern Illinois University, Edwardsville CS department.

Four students that had completed the HCI course previously were run though the card-sorting task, as they were familiar with the material.

For the paper prototype, combinations of CS students who had and had not taken the HCI course were recruited. This combination was chosen for the different perspectives the two groups provide. Volunteers that had taken the course were aware of what was needed by students, yet had not seen the new web site. Volunteers who had not

taken the course were representative of those students new to the class. Problems were continually encountered with the first iteration of the prototype, so a second iteration was created to resolve them. Three individuals were run through the first iteration and four through the second. One person who had run though the first paper prototype also ran though the second.

Materials

All materials are simple office products that can be purchased at any convenience store. The card-sorting task used plain white note cards. So that the text would be reasonably large and legible, the cards were labeled with a dark-blue, medium-tipped felt pen. Participants were given a pencil with an eraser to allow individuals to add and change their input freely (see Figure 1).

For the paper prototyping task, a manila folder, post-it notes, sheets of white paper, and a photocopy of a hand drawn generic browser window was used. Information was written in pencil so it could be erased and modified as the experimenter and user deemed appropriate during the session (see Figure 2a and 2b).

The SIUE Usability Lab was used to run the study. The room is divided into two sections. The War Room, normally used for team observation, held the media equipment used for videotaping (see Figure 3a) while the participants completed the tasks in the usability room (see Figure 3b).

Testing Procedure and Results

For both tasks, participants were videotaped in the Usability Lab. Users were asked to read and sign a consent form (see Appendix A), verbally given a set of instructions (see Appendix B), and then were shown a simple example of how to do the task. It was emphasized that the usability of web site was being evaluated, not the user.

In the card-sorting task, participants were given a stack of shuffled cards with the names of web site objects written on them, a stack of blank cards, and a pencil. They were instructed to sort the cards into piles with other cards that seemed similar. If they thought that a card should be placed in more than one category or a new object needed to be added, they could use the provided blank note cards and pencil to make a new or duplicate card. They were given unlimited time to arrange the cards into what they felt was the right pile. Once they were happy with their stacks, they were asked to label each pile using a pencil and a yellow post it note. Next, they were asked to combine those groups into a higher-level group and again label those. A limit of two group levels were chosen to create a broad rather than deep structure to avoid over-tasking an individual's short-term memory store (Larson & Czerwinski, 1998).

Once the navigational information was gathered from the users it was examined for patterns. This information formed the hierarchical link structure for the paper prototype (see Appendix C). Eleven scenarios typical of an actual task that a student might perform while visiting the site were developed (see Appendix E).

For the paper prototype session, the user was asked to complete each of the scenarios. So that the observer could understand the participant's thought process, users were instructed to think out loud (see Appendix D). Observers then carefully watched for errors and difficulties. When questions were posed, the observer responded by inquiring what the participant expected the interface to do. This avoided introducing the designer's mental model and experimental biases, and gathered information about how the user anticipated how the program should act. When the scenarios were completed, the volunteers were solicited for feedback and thanked for their time. Following the meeting, the video capture was analyzed for issues missed during the sitting.

The first iteration revealed that students had difficulty discriminating amongst the syllabus, lecture material, and schedule, thus a second prototype was developed combining these areas under one link. As this appeared to solve problem, the design was converted into the final version of the site.

Educator Site

Participants

Professionals representative of those using HCI in the classroom were recruited. Specific fields solicited were art, psychology, computer science, instructional technology, and education. Again 3-5 people were sought for reasons discussed in the student section.

Four professors from the St. Louis, MO, metro area volunteered to run though the card-sorting task.

The online usability survey link was posted to the Association of Computing Machinery's Significant Interest Group in Computer Science Education list server and directly e-mailed to individuals who had expressed an interest in the material. From this posting 3 people responded.

Materials

Card-sorting materials were identical to those used in the students' task (see Figure 1).

The on-line survey was a modification of the Questionnaire for User Interaction Satisfaction (Shneiderman, 1998; see Appendix F). Three SIUE graduate students used Macromedia Dreamweaver and Microsoft Access to develop an Active Server Page to display the questions and record the data.

Testing Procedure and Results

The card sorting procedure was identical to that of the students' with the exception that the task was administered in various locations due to accommodation and travel restrictions. All participants were in a quite area and sat down at a large, clean table similar to that provided in the lab.

For the survey, the solicitation e-mail contained information on what that the web site was, why individuals were being asked to take the questionnaire and a link to the site. The survey requested that users explore the website first, and were given a hyperlink to the main page. After spending some time on the site, users were requested to fill out the questionnaire to the best of their knowledge.

Response to the survey was very low (n=3); however, the minimum n to detect the majority of flaws was met and the summarized data indicated no major usability issues (see Appendix F).

Results and Discussion

Experiment issues

Even in the most careful investigation, there is always the possibility that the variables being studied are confounded, thus it is important that the researcher reflects on where this may have happened in his or her study. Examination revealed several areas where bias possibly occurred.

First, in the card sorting task, the web objects were written in a way that may have influenced subjects to place a card in one pile versus another (e.g. Lab Description, Lab Rules, Lab Sign-up). Examining individuals' responses to the task shows this was not the case, as participants felt free to add an identical card or put the card into another category.

Another possible confound was that the card-sorting task was not always administered in the Usability Lab. Again, no differences were observed between subjects.

Secondly, in the paper prototyping task, the experimenter may have missed information provided by users. Sessions are normally a group process where one or more people concentrate solely on collecting feedback from a user and then discuss their observations with the other team members after the participant has departed (Beyer & Holtzblatt, 1998). However, this session was run by one inexperienced individual who played the role of the interviewer, computer and note taker. To compensate for this shortcoming the sessions were videotaped and reviewed. Nevertheless, the observer may have overlooked certain details or missed an opportunity to solicit questions that should have been asked during or after the session.

Finally, though the survey was distributed amongst a large number of people, it was hindered by a poor response rate; therefore, it was not representative of the target population (e.g. all users used Netscape and no one used the accessibility features). Additionally, surveys are designed to average a large number of replies rather than focus at an individual level, thus a response that is significantly different is considered an outlier and its influence is normally negated by the other responses. With a low return; however, outliers have a greater effect on the estimated population mean. For this questionnaire, one individual had several responses that conflicted with the other two users. This person felt the site was rigid, dull and difficult to navigate, while the other participants indicated the opposite. Further, the individual stated that they had only visited the site because they were asked to do so, indicating a different motive than the other two participants. However, with such a low number of replies, it is impossible to know if the individual's responses should be treated as outliers. Nonetheless, the survey

did meet the minimum response quota for finding major issues, providing the experimenter with enough information to assess the success of the site's usability.

Platform Considerations

As platforms vary significantly from machine to machine, it is important to consider these various environments when designing a site. One must weigh the pros and cons and make decisions based on the least disruptive and most suitable choices.

There are three main considerations that had to be accounted for in the site design. First, while only 7 % of monitors have a maximum resolution of 640 × 480 (Kalbatch, 2001), educational institutions tend to retain their older computers and use donated systems. Second, although personal computers and Microsoft's Internet Explorer are clearly the popular choice among Internet users (Leer, 2002), other platforms and web browsers are still employed by the target audience (e.g. a designer using a Macintosh or a computer scientist using Unix). Finally, while broadband is becoming more commonplace, there is still a high probability that some individuals will be using modems.

For these reasons the site was designed to work across multiple platforms and browsers, fit on a 640 × 480 screen and obtain fast downloading times. This was accomplished by keeping the number of graphics to a minimum; optimizing graphics, video and files; streaming video for the movie clips; and alerting users to the size of larger objects.

Accessibility

As of June 21, 2001, section 508 of Americans with Disabilities Act requires that all Federal agencies' electronic and information technology be accessible to people with disabilities (Department of Justice, 2001). Section 508 establishes specific requirements

for “any electronic and information technology developed, maintained, procured, or used by the Federal government.” These requirements are based around the Web Accessibility Initiative (WAI) from the World Wide Web Consortium (W3C) guidelines (W3C, 2002). As the site is developed for a federal agency, it is created in accordance with these requirements.

Non-disabled users will find these guidelines benefit them as well. In addition to making information available to a wider range of people, it gives users more options on how they wish to view and navigate though the pages (e.g. verbal vs. visual). This means users can interact with the site in a way that best fits their learning style.

To assure accessibility, several measures were taken. First, the book “Constructing Accessible Websites” (Thatcher et. al., 2002) was consulted. Second, the site was checked for usability using Dreamweaver MX’s Section 508 Accessibility Suite. Third, the WAI guidelines checklist was followed and the site developed to conform to priority level two (see Appendix G for checklist). The guidelines are adhered to as follows:

- Visually impaired and colorblind people require a page that is high-contrast, able to be magnified, and/or modifiable. To achieve this, first the site is designed for a 640×480 screen resolution. This allows the screen to be made as large as possible without the loss of functionality and aesthetics. Second, style sheets were employed so that users can easily override style defaults to match their specific font size and color needs. Third, the page was printed in black and white to check for contrast concerns (Figure 4). Finally, color alone was not used to convey information (Arditi, 2002).

- Blind users interact with a website through sound and touch, thus it is important for these users to be able to explore the entire site via auditory and tactile means.

  To make visual information meaningful, all pictures are labeled with a descriptive alternative tag. Furthermore, materials are presented using the latest version of Adobe Acrobat, Microsoft Word, and Cascading Style Sheets so they are usable by reader software. Power Point presentations are not yet compliant to accessibility standards, as they do not support this function when viewed in presentation mode; however, a reader can read documents opened directly through the program. To resolve this issue, the documents are saved in two formats: one for individuals viewing the presentation directly through Power Point and another for people viewing the file over the Internet. The Power Point document has labeled images and was tested with a reader to make sure the layout was read in the correct order. For the Internet version, instead of showing a presentation, the file was converted into HTML using the Web Accessibility Wizard for Microsoft Office by Illinois Center for Instructional Technology Accessibility (Illinois Center for Instructional Technology Accessibility, 2003).

  To aid navigation, the site uses frames – one for the site's main links and one for content. The frames are titled to allow the user to chose which section they wish to hear. This prevents them from having to listen to the hyperlinks every time they access a new page. Additionally, since blind people do not use a mouse, the page was checked for usability using only the keyboard.

- Auditory impaired and deaf users are opposite of blind users – they interact with the site primarily through vision. In addition, closed captioning was applied to the videos using the National Center for Accessible Media's media access generator, MAGpie (National Center for Accessible Media, 2003).

- Motor impaired individuals use keyboards to navigate the Internet. This requirement has been fulfilled as discussed above in the section on blind users.
- People prone to having seizures are sensitive to repetitive flashing objects exhibiting flickering in the frequency range of 2-55Hz (Thatcher et al., 2002.) To minimize inducing an attack, animation on the website is kept to a minimum and no blinking images are used.

Navigation

As the site is produced for educational and informational purposes, the design focused on simplicity and on consistent navigation versus eye-catching graphics and an explorative approach (Figure 5). Implementing this was a challenge as the site is targeted to three different audiences frequently seeking different information (i.e. CS 321 students getting class information, educators gathering information about teaching participatory design, and CS 140 students signing up to be participants). This was resolved by creating an introduction page that contains a high-level site map, which allows the users to pick which of the three sites they wish to browse and to go directly to the section they are interested in.

Within each site, various approaches are used to facilitate efficient navigation. From the main site, an animated link was created to catch the attention of the CS 140 students, as they will most likely be visiting the site only once to use the sign up sheet. This allows them to quickly and easily complete their task. The student and professional areas were developed from the same template, enabling users to transfer their wayfinding knowledge from one site to the other. The two sites are differentiated by their color scheme – the Student Site in warm colors and the professional in cool – so users quickly identify which section they are in.

For the location of the site's hyperlinks, experimental research was consulted. Studies examining eye-scanning patterns show that users look to the upper left of a page after viewing the center content, and is where people look when searching for links (Schroeder, 1998); hence, this is where the high-level hyperlinks are located. Frames are used to keep the links in a visible and stable location, and the links are arranged from most to least used. Additionally, every page is uniquely labeled with a descriptive title. These techniques reduce recall memory load and aid wayfinding for users exploring the site contents and for those who enter via a search engine.

Studies also show that users prefer to print documents rather than read large amounts of information on-line (Neilson, 1996); therefore, to facilitate this task, documents open in a new printer friendly window. Also, a new window opens for off-site pages. This allows users to easily switch back to the class site and also reminds the users that the new site is not in the SIUE domain. To avoid confusion, a text message informs users where this will occur.

Graphics

To represent the field of HCI, the graphics combine a biological feel with a technological undertone. The background is a simplified pattern of red blood cells taken from a microscopic photo. The logo is composed of a Multi-Resonance Image scan of the human cranium. This technology shows the brain while also maintaining the head's silhouette – as if one can see into the inner working of an individual, such as HCI endeavors to do. This was altered to give it a more digital feel. A maze superimposed over the brain signifies the psychological side of the science and the puzzle of decoding the human mind. A set of green binary numbers flows from the frontal lobe out into the environment alluding to the computer science field, thinking about computers, and working with technology. The Student Site is done in reds, suggesting the imparting of

information to the students, thus “oxygenating” their minds. Alternatively, while the Educator’s Site maintains the same look and feel, it uses blues, suggesting that they were behind the scene before the “oxygen” had entered the system.

Final Testing

Once the site was built, it was tested for compatibility on the Macintosh and Microsoft Windows platforms, and on the web browsers Netscape, Opera, and Internet Explorer. The site was checked for accessibility using the IBM Home Page Reader and the text browser, Lynx. Finally a local usability specialist, Joe Grant, did a heuristic evaluation on the site (see Appendix H). From these tests, changes were made to the site to make it more usable across platform and at the individual level.

Future Development

As of July 2002, an on-line electronic sign-up sheet to reserve lab time and an electronic on-line electronic form for the CS 140 subjects to sign up for participation credit was under development.

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Figure Captions

Figure 1: Example of a finished Card Sorting Task.

Figure 2a: Example of a Paper Prototype Task.

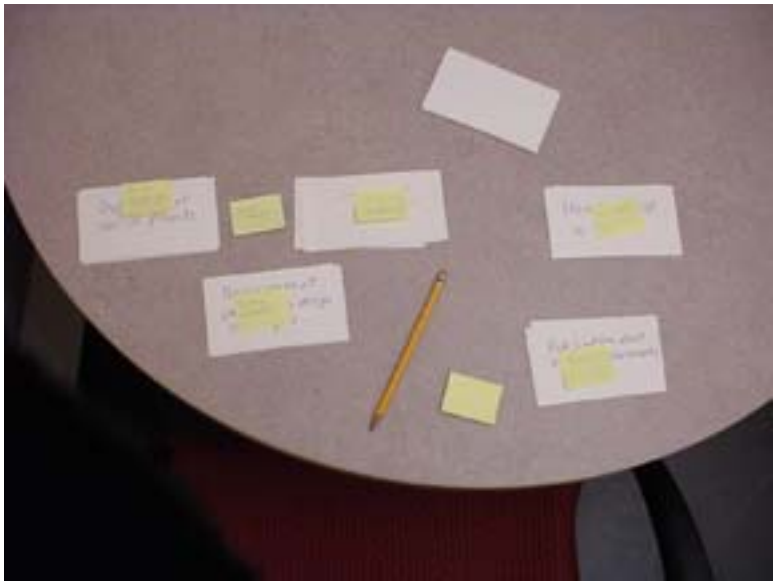
Figure 2b: Participant running though a usability task.

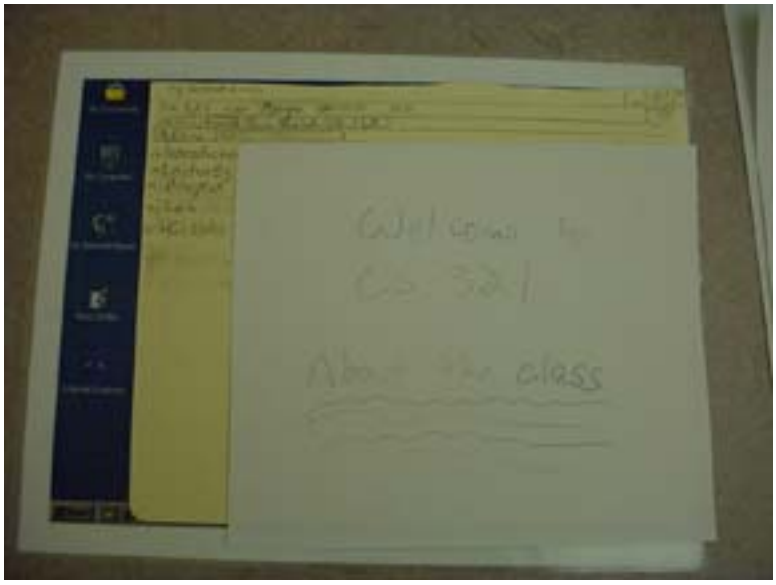
Figure 3a: The “War Room” is where participants were videotaped.

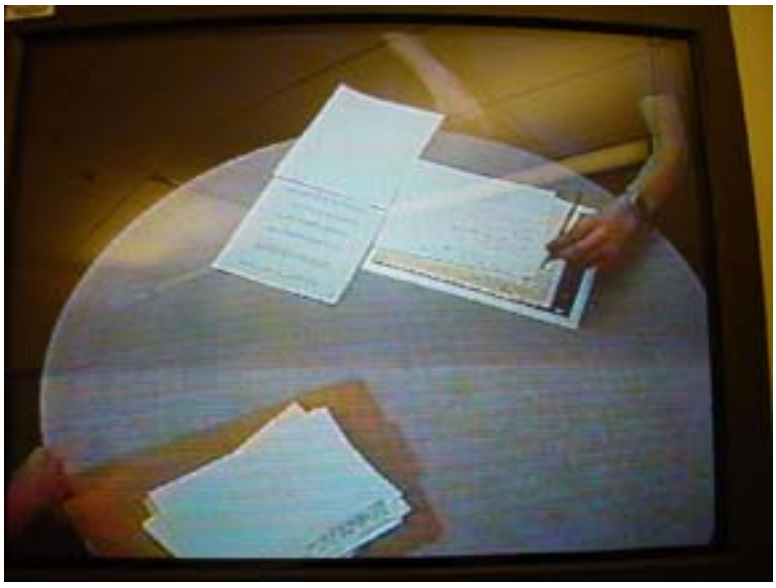
Figure 3b: The Usability Room is where the study was run.

Figure 4: Pages printed in black and white to show contrast.

Figure 5: Screen Shots of final web site.







Home Page

Student site

Educator Site

Appendix A: Consent Form

SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE
ACKNOWLEDGEMENT OF INFORMED CONSENT

Investigators Dr. Jerry Weinberg, Dr. Mary Stephen, and Kristin Caufield are conducting a research project entitled:

Human-Computer Interaction Software Design Curriculum Using Participatory Design Methods

The scope of this project is to develop the course materials and laboratory setting for students studying principles in Human-Computer Interaction to perform an ethnographic design study using observation, interviews, and videotape analysis.

It is my understanding that:

1. Part of the project involves videotaping, and I may be filmed. The tapes will be used for research and educational purposes only. Excerpts from the tapes may be used as part of a professional presentation on the research findings. All of the research data will be collected and analyzed in a manner that assures confidentiality. My name and identity will not be revealed.

2. None of the procedure will place me in physical danger; I will be warned of any other risks.

3. Experimental procedures will be explained to me prior to their administration

4. I may ask questions of the researcher, and expect pertinent responses.

5. I may refuse to participate in the study, or may discontinue participation at any time without prejudice, question, reprimand, or negative consequence to my course grade.

6. Benefits and/or risks of the research to others or me will be explained.

I have read and the above statements and understand the purposes of this study. I hereby agree to cooperate and participate in the research project.

_____
Participant

_____
Date

_____
Principle investigator(s)

_____
Date

Department of Computer Science
Southern Illinois University, Edwardsville
Engineering Building Box 1656
Edwardsville, ll., 62026
(618) 650-2386

Appendix B: Card Sorting Instructions

1) What I am doing here today is called card sorting. I am building a web page for the CS 321 course/NSF Grant, and would like to know how people organize the material we are putting on the site so I know where to put information. What I am going to do today is give you this stack of cards, which represent different web objects for the site. I would like you to sort through the stack putting cards that seem similar to one another together. There is no right or wrong, and you can rearrange the cards as many times as you would like until you think they seem right. If there is a card you think belongs in more than one pile, use this stack of note cards and pencil to make new cards, and place them in the stacks you think they should go. If you think that something should be in the cards that isn't, also use the note cards to make a new web object, and place it in the pile you think it should go into.

   So, for example (using a pre-made example) let's say you have a stack of cards that say on them: cow, snake, bird, horse, cat and dog. You can group the cat and dog in one category, and maybe cow and horse in another, and lastly the snake in a third. Let's say you think lizards should belong in the group too, you can make a card for lizard, and place it under the snake.

   Do you understand?

   (User does task)

2) OK, now that you have your cards in piles that you are happy with, I am going to ask you to use these sticky notes to put a label on each pile that you think best describes their contents.

   Going back to my example, I am going to label cats and dogs as house pets, cows and horses as farm animals, and snakes and lizards as caged pets.

   Do you understand?

   (User does task)

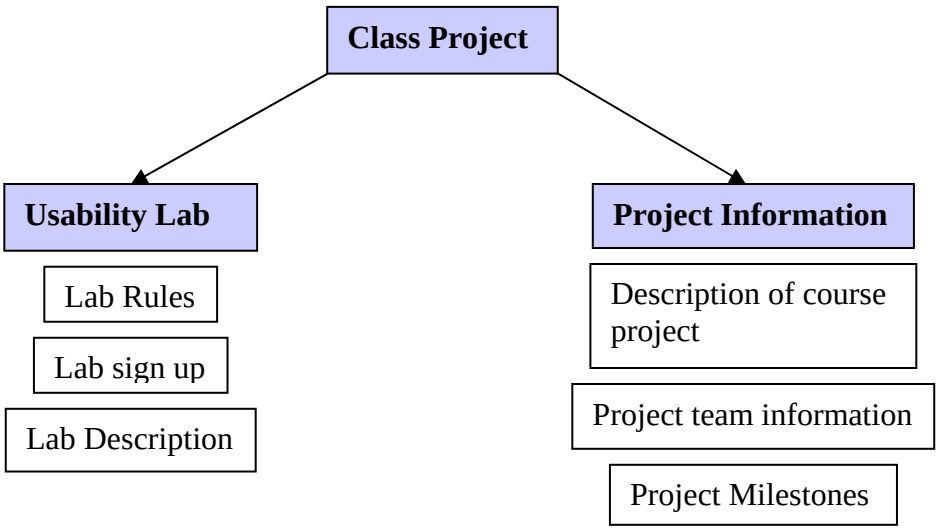
3) Lastly, I would like to know if any of the groups you have made go together. So for instance, in my example, I think that the house pets, and caged pets should go together because they are both carnivores, while the farm animals stay in their own category because they are herbivores.

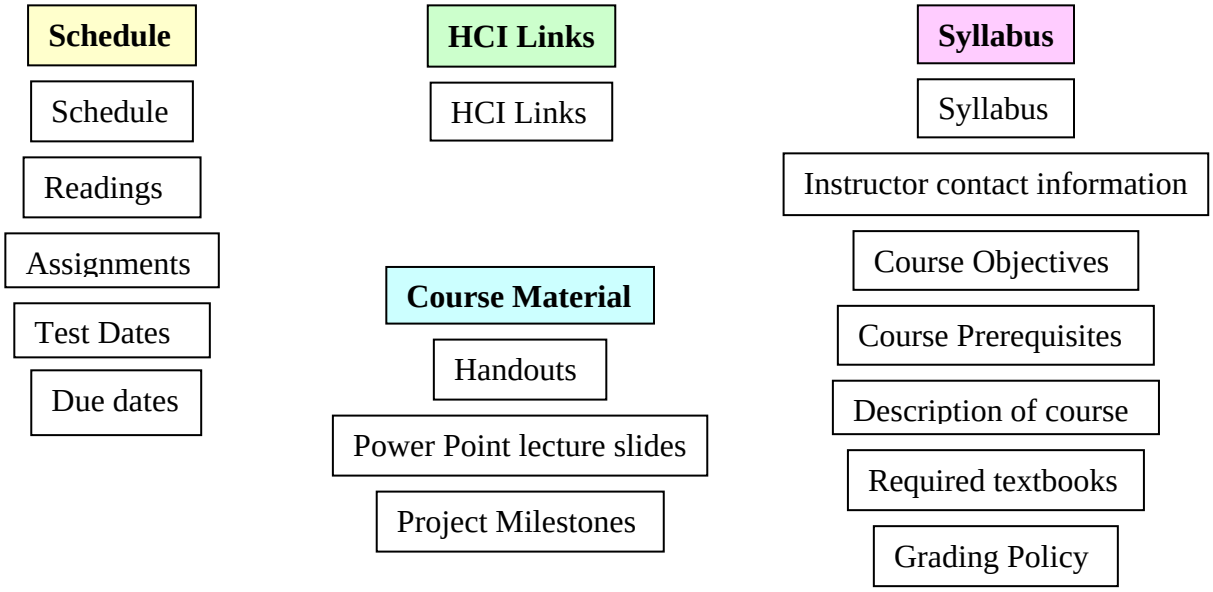
   Do you understand?

   User finishes task and you thank them for their time.

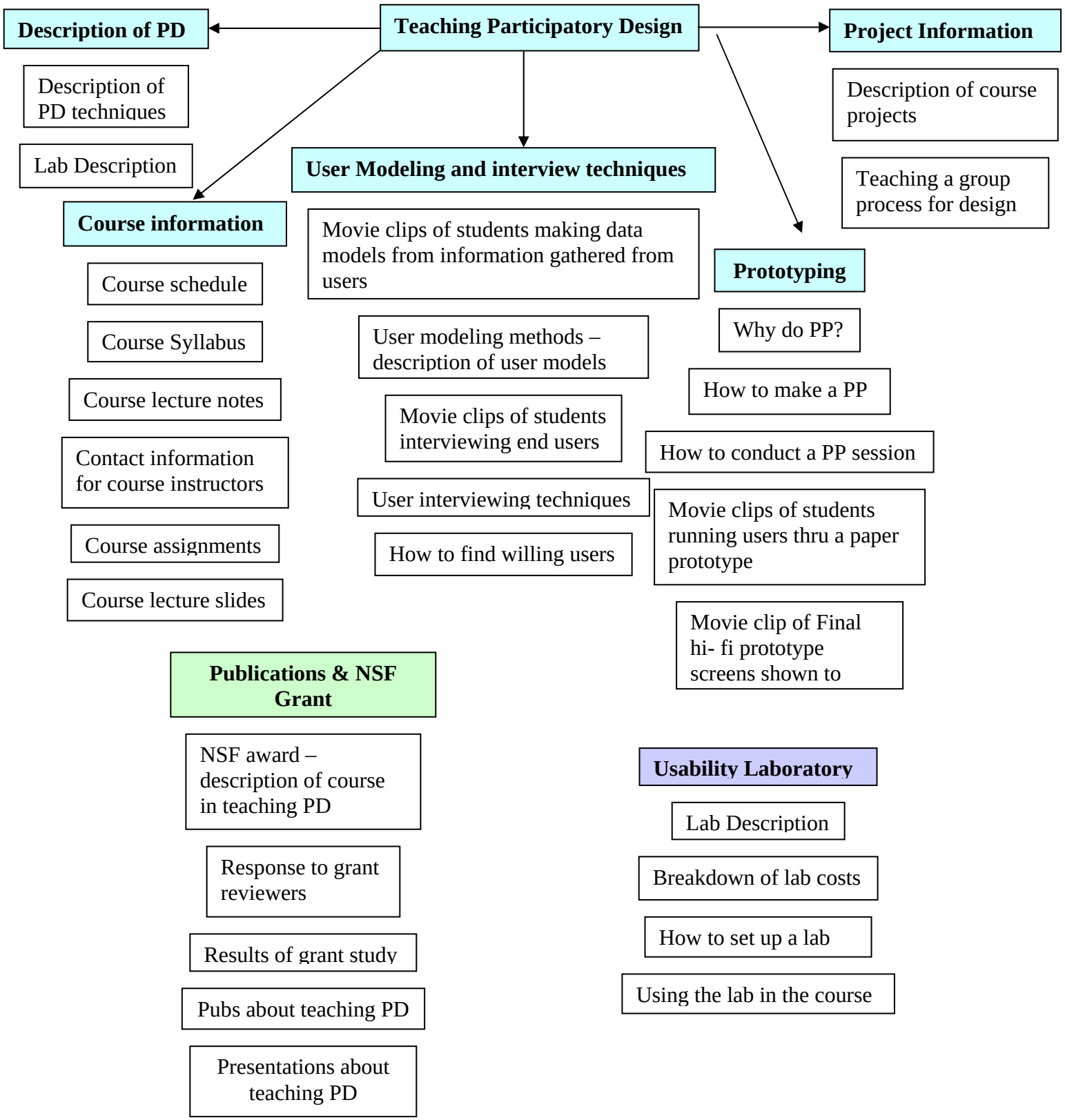
Appendix C: Card Sorting Results

Student Site





Educator Site



Appendix D: Paper Prototype Instructions

What I am doing here today is called paper prototyping. I am building a web page for the CS 321 course/NSF Grant, and would like to know if people are having problems using it. What I am going to ask you to do is navigate though several web pages. I will pretend to be the computer. While you are doing this I am going to ask you to say out loud what you are thinking. This will let me know where problems exist and what needs to be fixed so that people have an easier time using the web site. I am videotaping people doing this, so that I can examine the tapes and see things I missed during the sessions.

If you are interested in participating, I need you to fill out this consent form. It is basically just a form saying that you agree to be in the study and it notifies you that you can quit at any time.

Do you have any questions?

END: Thank you for you time. Is there anything else you would like to tell me about the web site, anything you would like to see different, or that can be improved? Etc.

Appendix E: Paper Prototype Scenarios

Iteration 1

1) You are going on vacation the first weekend of September and would like to get a head start on your readings. You would like to know what needs to be read for the week of September 2nd-6th.

2) You want to contact Mary Sue, a member of your project team, but have lost her e-mail. Use the web site to write a message to her letting her know you will be able to meet next Monday.

3) You want to use the Usability Lab for your team meeting next week. Reserve the lab for Monday September 10th from 8-11PM.
   Your team name is Dilbert.
   Your password is HCIbert.

4) You just realized you misread the times you had written down. Change the reservation to 8-11AM.

5) Your dog ate your syllabus. Print up a new one to replace it.

6) You were sick on August 23rd. Find out what in-class material you missed and print it.
7) You heard in class that there is a website to help you with your project. It is called "Usability Toolkit" and will give you the basic things you need to make a paper prototype. Go to the site.
8) You would like to know when the first exam is so that you can make sure that you have enough time to prepare for it. Find the date.
9) Your car won't start again. Find Dr. Weinberg's phone number so that you can tell him you are going to miss class that day.
10) Your team needs to make sure that they have their interviews done before the first milestone is due. Find the date of the first project milestone.

Iteration 2

1) You were sick on August 22nd. Find out what in-class material that you missed and print it.

2) You heard in class that there is a website to help you with your project. It is called "Usability Toolkit" and will give you the basic things that you need to make a paper prototype. Go to the site.

3) Your car won't start again. Find Dr. Weinberg's phone number so that you can tell him that you are going to miss class that day.

4) You would like to know when the first exam is so that you can make sure that you have enough time to prepare for it. Find the date.

5) Your dog ate your syllabus. Print up a new one to replace it.

6) You are going on vacation the first weekend of September, and would like to get a head start on your readings. You would like to know what needs to be read for the week of September 2nd-6th.

Appendix F: Survey to Educators and Results

The average results are in red next to the survey question

Participatory Design Survey

Before answering this survey please visit and explore the web site at: http://www.cs.siue.edu/hci/ (link opens a new window).

Please answer each of the following questions to the best of your knowledge:

1) Background:

1.1) Age: _____ years **47.5**

1.2) Sex: ☐ Male ☐ Female **M=2; F=1**

1.3) State: _____ *(Two letter initial. E.G. IL = Illinois) **IL, MO & IN**

1.4) Employer:

_____

1.5) Job Title: 2 Professors; 1 Usability Specialist

_____

1.6) Do you teach? Yes =3

☐ yes ☐ no

1.7) What type of system do you usually use? PC = 3 Mac = 1

☐ PC

☐ Macintosh

☐ Unix

☐ Other _____

1.8) What type of Internet browser do you usually use? Netscape = 3

- ☐ Internet Explorer
- ☐ Netscape
- ☐ Opera
- ☐ Other ____

1.9) How long have you been using the Internet? ____ Years **14.0**

2) For each scale, please select the one answer which most appropriately describes your feelings and impressions when using the "Human Computer Interaction using Participatory Design" web site.

(Scale is rated from 1 to 5)

2.1) Your overall reaction to the web site

Terrible.....Satisfying **4.7**

☐ ☐ ☐ ☐ ☐

Rigid.....Flexible **2.7**

☐ ☐ ☐ ☐ ☐

Quick.....Slow **1.7**

☐ ☐ ☐ ☐ ☐

Dull.....Stimulating **3.3**

☐ ☐ ☐ ☐ ☐

2.2) Navigating through the site

Difficult.....Easy **4.0**

☐ ☐ ☐ ☐ ☐

2.3) Amount of information on the screen 3.0

Too much.....Too little

☐ ☐ ☐ ☐ ☐

2.4) Progression though the site 4.3

Confusing.....Clearly marked

☐ ☐ ☐ ☐ ☐

2.5) Arrangement and layout of information on screen 4.3

Illogical.....Logical

2.6) Material

Dull.....Stimulating **4.3**

Useless.....Useful **4.3**

2.7) Terminology 4.3

Illogical.....Logical

2.8) Moving back and forth between screens 3.3

Confusing.....Clear

2.9) Consistency between pages 2.0

Consistent.....Inconsistent

2.10) Colors 3.3

Annoying.....Pleasing

2.11) Images & Graphics

Sharp.....Fuzzy **2.3**

Pleasing.....Annoying **2.3**

2.12) Video Clips

Quick.....Slow **2.7**

Interesting.....Dull **2.3**

Unclear.....Clear **3.7**

2.13) Fonts 2.0

Legible.....Illegible

2.14) Time to Learn 1.7

Quick.....Slow

2.15) Exploration 4.3

Risky.....Encourages

2.16) Ordering free material 3.7

Intuitive.....Confusing

2.17) Hyperlink naming conventions 2.7

Logical.....Illogical

2.18) Are there any changes you would recommend for any of the link names to make them more clear? (Optional)

1 = Felt "What is PD" title did not convey information properly

2.19) Did you find any broken links?

Yes No

If so, which ones?

1 = Possible problem with back button?
Testing did not recreate problem

2.20) Did you use any of the accessibility features?

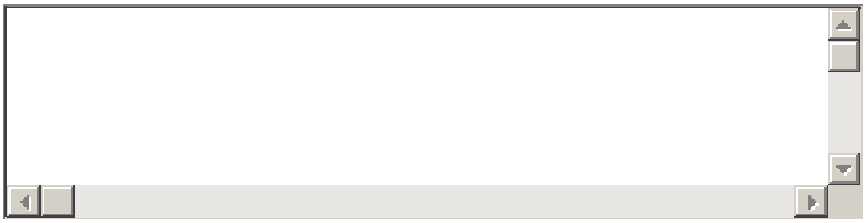
Yes No **No = 3**

If so, what did you use?

2.21) Did you have a problem with any of the accessibility features?

Yes No **No = 3**

If so, which ones?



2.22) What is your main interest in this site?

2= Educators 1=Asked to visit site

2.23) Please use this space to make any other comments and suggestions:

2 = Really liked the material
1= Felt that technical writer needed to review content

Submit Reset

*Questionnaire was based from: Questionnaire for User Interaction Satisfaction (© University of Maryland 1997)

Appendix G: Web Content Accessibility Guidelines 1.0 W3C Recommendation 5-May-1999
Downloaded from http://www.w3.org/TR/WCAG10/full-checklist.html

Priorities

Each checkpoint has a priority level assigned by the Working Group based on the checkpoint's impact on accessibility.

[Priority 1]

A Web content developer **must** satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents.

[Priority 2]

A Web content developer **should** satisfy this checkpoint. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint will remove significant barriers to accessing Web documents.

[Priority 3]

A Web content developer **may** address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents.

Some checkpoints specify a priority level that may change under certain (indicated) conditions.

Priority 1 checkpoints

In General (Priority 1)	Yes	No	N/A
1.1 Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). *This includes*: images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.			
2.1 Ensure that all information conveyed with color is also available without color, for example from context or markup.			
4.1 Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions).			
6.1 Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document.			
6.2 Ensure that equivalents for dynamic content are updated when the dynamic content changes.			
7.1 Until user agents allow users to control flickering, avoid causing the screen to flicker.			

14.1 Use the clearest and simplest language appropriate for a site's content.			
And if you use images and image maps (Priority 1)	**Yes**	**No**	**N/A**
1.2 Provide redundant text links for each active region of a server-side image map.			
9.1 Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape.			
And if you use tables (Priority 1)	**Yes**	**No**	**N/A**
5.1 For data tables, identify row and column headers.			
5.2 For data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells.			
And if you use frames (Priority 1)	**Yes**	**No**	**N/A**
12.1 Title each frame to facilitate frame identification and navigation.			
And if you use applets and scripts (Priority 1)	**Yes**	**No**	**N/A**
6.3 Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page.			
And if you use multimedia (Priority 1)	**Yes**	**No**	**N/A**
1.3 Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation.			
1.4 For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation.			
And if all else fails (Priority 1)	**Yes**	**No**	**N/A**
11.4 If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page.			

Priority 2 checkpoints

In General (Priority 2)	**Yes**	**No**	**N/A**
2.2 Ensure that foreground and background color combinations provide sufficient contrast when viewed by someone having color deficits or when viewed on a black and white screen. [Priority 2 for images, Priority 3 for text].			
3.1 When an appropriate markup language exists, use markup rather than images to convey information.			
3.2 Create documents that validate to published formal grammars.			
3.3 Use style sheets to control layout and presentation.			
3.4 Use relative rather than absolute units in markup language attribute values and style sheet property values.			
3.5 Use header elements to convey document structure and use them according to specification.			
3.6 Mark up lists and list items properly.			
3.7 Mark up quotations. Do not use quotation markup for formatting effects such			

as indentation.			
6.5 Ensure that dynamic content is accessible or provide an alternative presentation or page.			
7.2 Until user agents allow users to control blinking, avoid causing content to blink (i.e., change presentation at a regular rate, such as turning on and off).			
7.4 Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.			
7.5 Until user agents provide the ability to stop auto-redirect, do not use markup to redirect pages automatically. Instead, configure the server to perform redirects.			
10.1 Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user.			
11.1 Use W3C technologies when they are available and appropriate for a task and use the latest versions when supported.			
11.2 Avoid deprecated features of W3C technologies.			
12.3 Divide large blocks of information into more manageable groups where natural and appropriate.			
13.1 Clearly identify the target of each link.			
13.2 Provide metadata to add semantic information to pages and sites.			
13.3 Provide information about the general layout of a site (e.g., a site map or table of contents).			
13.4 Use navigation mechanisms in a consistent manner.			
And if you use tables (Priority 2)	**Yes**	**No**	**N/A**
5.3 Do not use tables for layout unless the table makes sense when linearized. Otherwise, if the table does not make sense, provide an alternative equivalent (which may be a linearized version).			
5.4 If a table is used for layout, do not use any structural markup for the purpose of visual formatting.			
And if you use frames (Priority 2)	**Yes**	**No**	**N/A**
12.2 Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone.			
And if you use forms (Priority 2)	**Yes**	**No**	**N/A**
10.2 Until user agents support explicit associations between labels and form controls, for all form controls with implicitly associated labels, ensure that the label is properly positioned.			
12.4 Associate labels explicitly with their controls.			
And if you use applets and scripts (Priority 2)	**Yes**	**No**	**N/A**
6.4 For scripts and applets, ensure that event handlers are input device-independent.			
7.3 Until user agents allow users to freeze moving content, avoid movement in pages.			
8.1 Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies [Priority 1 if functionality is important and not presented elsewhere, otherwise Priority 2.]			

9.2 Ensure that any element that has its own interface can be operated in a device-independent manner.			
9.3 For scripts, specify logical event handlers rather than device-dependent event handlers.			

Priority 3 checkpoints

In General (Priority 3)	Yes	No	N/A
4.2 Specify the expansion of each abbreviation or acronym in a document where it first occurs.			
4.3 Identify the primary natural language of a document.			
9.4 Create a logical tab order through links, form controls, and objects.			
9.5 Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls.			
10.5 Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links.			
11.3 Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.)			
13.5 Provide navigation bars to highlight and give access to the navigation mechanism.			
13.6 Group related links, identify the group (for user agents), and, until user agents do so, provide a way to bypass the group.			
13.7 If search functions are provided, enable different types of searches for different skill levels and preferences.			
13.8 Place distinguishing information at the beginning of headings, paragraphs, lists, etc.			
13.9 Provide information about document collections (i.e., documents comprising multiple pages.).			
13.10 Provide a means to skip over multi-line ASCII art.			
14.2 Supplement text with graphic or auditory presentations where they will facilitate comprehension of the page.			
14.3 Create a style of presentation that is consistent across pages.			
And if you use images and image maps (Priority 3)	**Yes**	**No**	**N/A**
1.5 Until user agents render text equivalents for client-side image map links, provide redundant text links for each active region of a client-side image map.			
And if you use tables (Priority 3)	**Yes**	**No**	**N/A**
5.5 Provide summaries for tables.			
5.6 Provide abbreviations for header labels.			
10.3 Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current page or some other) for *all* tables that lay out text in parallel, word-wrapped columns.			
And if you use forms (Priority 3)	**Yes**	**No**	**N/A**
10.4 Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas.			

Appendix H

Author's Note: Unknown to the designer, the website had been moved for security purposed shortly before the heuristic evaluation, thus several links were broken. This occurred on the CS 140 link (slide 4), and the Sequence Model link (slide 12).

Heuristic Review

HCI Web Site
SIU-Edwardsville

Joe Grant

joegrant413@yahoo.com

mailto:joegrant413@yahoo.com

Positive: Home Page Pictures

Quickly communicates the site is about:

- Working with people
- Students
- Analysis among a team

Heuristic: Recognition rather than recall

Suggestion: Consider making link to a larger version of each image.

Positive: Home Page Graphics

HCI graphic

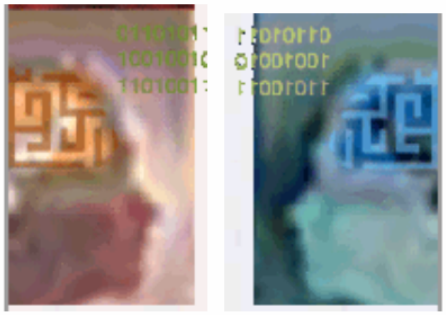
•Very visible and prominent

•Obviously the main point of the site

Blue and red graphics

•Convey subtle ideas that the site is about:

- •The mind or the brain
- •A maze or puzzle within the mind



Opportunity: Create Links Where Expected

Educator's Site

•Underneath the blue graphic on home page

•Because it is blue and immediately underneath an important graphic, expected to be a link

Heuristic: Follow consistency and standards

CS140 Sign-Up Sheet

•It is prominent on home page

•There is no other information concerning this on home page

•Although not blue, students will try it as a link. No other way to proceed is apparent.

•Heuristic: Make actions, object, or options visible or immediately retrievable.

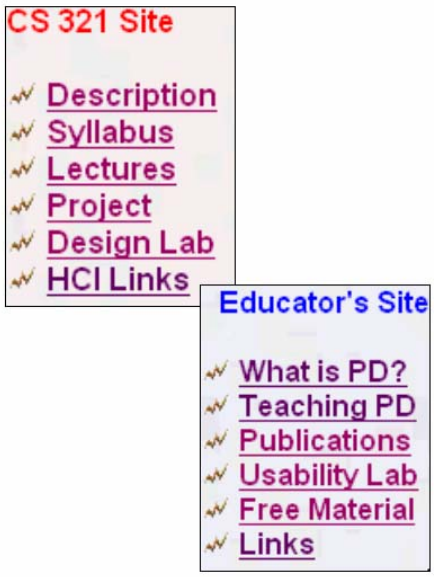
Positive: Organizational References

- Helps web visitors who could come from anywhere
  - Before coming, might have no idea this site is associated with SIUE, or any other university
- SIUE image quickly clarifies the site's association with the university
- Images from well-known and respected third-party organizations add to the site's credibility and authority

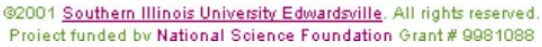
Positive: Main Links

- In general, all of the main navigation links are very clear and distinct from each other

Heuristics
- Match between system and the real world - speak the users' language
- Make actions, objects, and options visible or immediately retrievable.



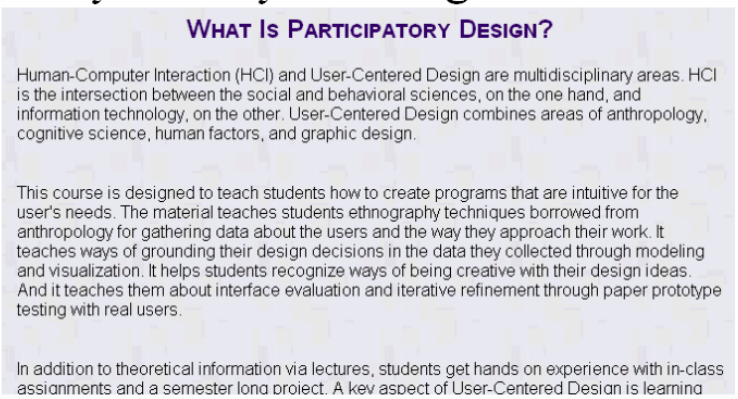
Opportunity: Update Copyright Notice



•2001 copyright on home page could lead user to think site has not been updated for several years

•Heuristic: Error prevention - design which prevents a problem from occurring in the first place.

Opportunity: Clarify First Page of Educator's Site

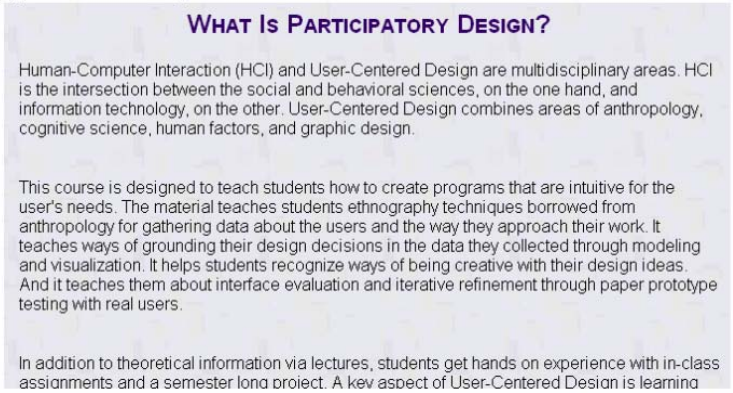


•First page that educators see should be particularly obvious

•Although it does say '..to create programs', the text does not *immediately* inform someone unfamiliar with PD, HCI, or UCD that these fields are strongly associated with computer software design or information technology.

•Heuristic: Match between system and the real world - speak the users' language

Minor Opportunity: Use Text Color That is Not Blue



WHAT IS PARTICIPATORY DESIGN?

Human-Computer Interaction (HCI) and User-Centered Design are multidisciplinary areas. HCI is the intersection between the social and behavioral sciences, on the one hand, and information technology, on the other. User-Centered Design combines areas of anthropology, cognitive science, human factors, and graphic design.

This course is designed to teach students how to create programs that are intuitive for the user's needs. The material teaches students ethnography techniques borrowed from anthropology for gathering data about the users and the way they approach their work. It teaches ways of grounding their design decisions in the data they collected through modeling and visualization. It helps students recognize ways of being creative with their design ideas. And it teaches them about interface evaluation and iterative refinement through paper prototype testing with real users.

In addition to theoretical information via lectures, students get hands on experience with in-class assignments and a semester long project. A key aspect of User-Centered Design is learning

- The text color is similar to the blue used for links
- Potential confusion more likely with headings
- However, this would not cause a problem for most people
- Heuristic: Follow consistency and standards

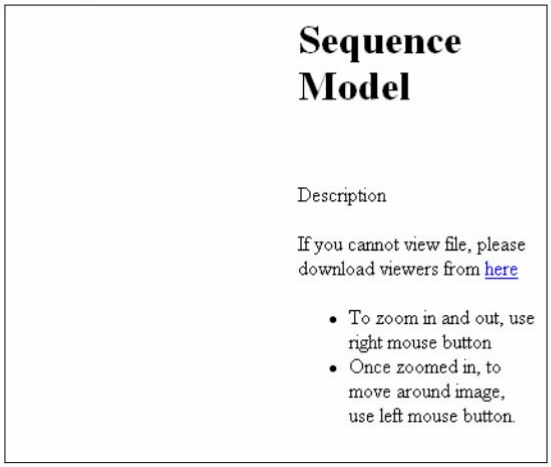
Opportunity: Make Graphic Text More Readable

- Main graphic on Educators' Site says '**teaching HCI**'
- The font is somewhat difficult to read
- Some users will miss the simple fact that this is text
  - Font color lacks contrast with background
  - Font is so stylized it is not readily recognizable as text
- Heuristic: Match between system and the real world - speak the users' language
- Suggestions
  - Use different font
  - Or keep the graphic as is, but plainly state 'teaching HCI' elsewhere on page

Positive: Teaching Media Very Clear

•Content and Type of Teaching Materials very clear
•Organized effectively by three columns
•The link text is understandable and distinctive
•Media file icons (QuickTime, etc.) are quickly discernable
•Heuristic: Make objects, actions, and options visible or easily retrievable.

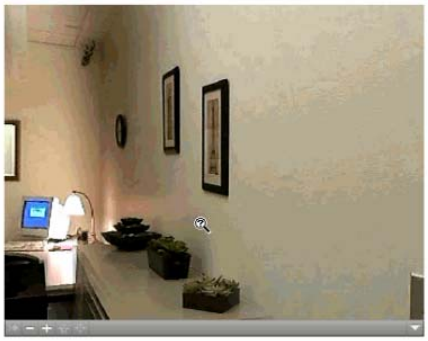
Bug: Sequence Model Didn't Appear



•Example of Sequence Model didn't come up, nor did page for helping with downloads
•A 'spot check' only – other links may act similarly
•Heuristic: Error prevention - design which prevents a problem from occurring in the first place.

Opportunity: Offer Alternatives to 360° view of Lab

- The 360° view of lab worked well
- However, not everyone will have the browser plug-in to watch
- Also, no guarantee that your users will see everything you'd like for them to view
  - You depend on them taking the time to navigate it.



- Heuristic: Make actions, objects, or options visible or immediately retrievable.

- Suggestion: Use a gallery of pictures
- Real estate web sites do this to be sure that potential buyers quickly preview all important views of house.

from http://www.cbgundaker.com/search/advanced/detail.jsp?type=res&mls_num=302312