

Data Analysis

Overview of Interview Sessions

Session 1

On the whole, interview participants answered the post-task and post-evaluation questions for all tasks as *Very easy* to *Easy*.

Both Participant 1 and 2 understood and navigated to the pages for Task 1 and 2 immediately. Both these tasks entailed use of the left side bar. They were able to do so because they understood the organization of the site and the terms – they understood that the task involved **Organ Systems** rather than **Body Basics**. They understood the difference between discussions and diagrams as well.

They did, however, have more incorrect menu choices for tasks that involved the tabs (Task 3 and Task 4) and hence, the organization. At first they thought that the page could be found in the organ systems section in the left sidebar. For Task 3, Participant 1 incorrectly chose **Anatomy of the Heart**; this may be because anatomy of the heart wording was in the scenario for the task. They did not realize that the task involved special functions that would be in a separate navigation menu. So it can be said that initially they did not understand the organization of the site with respect to these special functions. They paused and looked around the page longer than expected before they found the tabs at the bottom of the page; and did so only after they determined that the page they were looking for could not be accessed from the left sidebar navigation, or the top horizontal bar. Therefore, they understood the terms; they knew in which part of the website the information could not be found. For Task 4, Participant 2 had more wrong menu choices. After options in the left side bar were exhausted, Participant 2 looked to the tabs. Participant 2 was not sure if Congestive Heart Failure information would be found under **At the Clinic** or **Cross Section**, but correctly chose **At the Clinic**. Perhaps Participant 2 is not familiar with the condition Congestive Heart Failure. From the data I collected it was not clear why there was some confusion with this task. However, once both participants chose the correct tab, they had no problem navigating to the correct menu option.

Both Participants understood the Quiz icon and term.

Neither participant used the help functions (like Search, Glossary, Help, Features and Functions). Although Participant 1 did ask me if Search was the place to start for Task 1. I answered that it is up to the participant which page options are used. Participant 1 then decided to use the left side navigation menu.

Session 2

Participant 3 answered the post-task and post-evaluation questions for all tasks as *Very Easy* to *Easy*. Participant 4 answered the question most of the post-task and post-evaluation questions as *Very Easy* to *Neither Easy nor Difficult* with the exception of questions relating to the tabs, particularly for the first

task involving them. For Task 3, Participant 4 answered *Difficult* concerning completion of the task and *Very Difficult* concerning finding the selection.

Both Participant 1 and 2 understood and navigated to the pages for Task 1 and 2 immediately. Both these tasks entailed use of the left side bar. They were able to do so because they understood the organization of the site and the terms – they understood that the task involved **Organ Systems** rather than **Body Basics**. They understood the difference between discussions and diagrams as well.

They did, however, have more incorrect menu choices for tasks that involved the tabs (Task 3) and hence, the organization. At first they thought that the page could be found in the organ systems section in the left sidebar. Both Participants 3 and 4 incorrectly chose **Anatomy of the Heart**; this may be because anatomy of the heart wording was in the scenario for the task. They did not realize that the task involved special functions that would be in a separate navigation menu. So it can be said that initially they did not understand the organization of the site with respect to these special functions. They paused and looked around the page longer than expected before they found the tabs at the bottom of the page; and did so only after they determined that the page they were looking for could not be accessed from the left sidebar navigation, or the top horizontal bar. Therefore, they understood the terms; they knew in which part of the website the information could not be found.

Both Participants understood the At the Clinic and Quiz icons and terms.

Neither participant used the help functions (like Search, Glossary, Help, Features and Functions).

While in the **Organ Systems** section of the website, Participant 4 asked to go back to the **Body Basics** section “To see what was there”.

Graphic Designer Consultation

The Graphic Designer liked the grid layout as well as the **Color** icon. The Graphic Designer found that the discussion icon was “too cryptic”, meaning it looked too much like text (which is my intent for the icon). The diagram icon looks like dominos, the suggestion is to make it look more like a film strip with squares rather than circles. The **At the Clinic** icon was understandable, but the **Cross Section** did not read as optimally as it could. The suggestion was made to have a one-to-one correspondence between the circles; perhaps make it look more like a magnifying glass, and to have the shapes be more irregular like an amoeba rather than circles. I asked about the **At the Clinic** icon – this icon was found to be understandable. But, the discussion and diagram icons along the bottom were perceived as too much information and the correspondence between icon and topic is not clear potentially causing confusion.

Participant Responses to Post-Task and Post-Evaluation Questions

The participants were asked to answer closed end questions after each task and after all tasks were completed. For session 2, Post-Task closed end questions were added for a total of 10 questions versus 6 questions for session 1; the Post-Evaluation questions for session 1 and 2 are the same, except they are numbered 1 – 4 for session 2 and 7 – 10 for session 1. Post-Evaluation Question 10 is a duplicate of question 9; and therefore, will not be evaluated. Table 1 summarizes the responses for all questions by participant 1 and participant 2 during session 1; and responses to Post-Evaluation questions by participant 3 and participant 4 during session 2. Table 1A summarizes Post-Task Questions during session 2. Table 2 shows the tally of wrong menu choices and Table 3 shows the corresponding levels of frustration for each task. An analysis of these three variables follows.

Table 1. Participant Responses to Post-task and Post-evaluation questions

Participant	Questions										Total	Average
	Task 1		2	3	4	5	Post Evaluation					
1	1	1	1	1	2	1	1	1	1	2	12	1.2
2	1	1	1	2	2	1	2	2	1	1	14	1.4
3	2	2	1	1	1	1	1	1	1	1	4	1
4	2	3	1	5	1	2	2	3	2	2	9	2.25
Total	6	7	4	9	6	5	6	7	5	6		
Average	1.5	1.75	1	2.25	1.5	1.25	1.5	1.75	1.25	1.5		
Range	1	2	0	4	1	1	1	2	1	1		

Table 1A. Session 2 Participant Responses to Post-task questions

Participant	Post-Task Questions				Total	Average
	Task 2	Task 3	Task 4	Task 5		
	3	5	7	10		
3	1	1	1	N/A	3	1
4	1	4	2	N/A	7	2.3
Total	2	5	3	N/A		
Average	1	2.5	1.5	N/A		
Range	0	3	1	N/A		

For each question, a five step Likert scale was used for the answers where:

1 – Very easy 2 – Easy 3 – Neither Easy nor Difficult 4 – Difficult 5 – Very Difficult

Table 2. Participant Wrong Menu Choices for all Tasks

Participant	Tasks					Total	Average
	1	2	3	4	5		
1	0	0	2	0	0	2	.4
2	0	0	1	3	0	4	.8
3	1	0	1	0	0	2	.4
4	0	0	2	0	0	2	.4
Total	1	0	6	3	0		
Average	.25	0	1.5	.75	0		
Range	1	0	1	3	0		

Table 3. Frustration Level for Tasks

Participant	Frustration Level for Tasks					Total	Average
	1	2	3	4	5		
1	0	0	1	0	0	1	.2
2	0	0	2	3	0	5	1.0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
Total	0	0	3	3	0		
Average	0	0	.75	.75	0		
Range	0	0	2	3	0		

0 = None 1 = Little 2 = Some 3 = A lot 4 = Significant

Surprises in the Data

Task 3

It surprised me that participant 2 rated the question as Very Easy after two wrong menu choices, and a little frustration. (Although two wrong menu choices can be expected.)

Task 4

It surprised me that participant 2 rated the question as Easy after three wrong menu choices, a higher frustration level, and didn't know whether to choose **X Section** or **At the Clinic**. The rating given could be the question – the question asked about icons, not difficulty completing the task.

Icons

It surprised me that Participant 4 rated closed-end questions relating to the icons as *Very Easy* (and wrote in “Very Familiar”) and *Easy*, but made the comment, “I thought that the icons should be a bit bigger and more representative...”, for the open ended question, “What do you like least about the product?”

Outliners – scores that are larger or smaller than the average

Frustration Levels Participant 2's frustration level is higher than the average for tasks as well as higher than the average for participant 1 (.2 vs 1) – Participant 2 began the evaluation with a higher anxiety level than participant 1. Participant 2's anxiety level increased when Participant 1 had more difficulty with a task. Participant 2 also had double the amount of wrong menu choices than Participant 1. I think this was due to the higher anxiety level before the evaluation began. It would have been better if Participant 2 were not sitting within sight of participant 1's session.

But the averages for post-task and post-evaluation answers is very close for both participants. Perhaps the higher frustration or anxiety level is normal for Participant 2 or Participant 2 answered the questions in order to please.

Participants 3 and 4 showed no frustration whatsoever.

It is hard to know if Participant 2's frustration level and wrong menu choices are indicative of a usability problem or not. “When you have so few participants in a test, however, the one participant who had that problem may represent a large subset of users who will also have the problem. Sometimes there is no way to know, without further testing, whether the outlier is an anomaly or an indicator of something serious” (Dumas, 314). Based upon frustration levels for all participants from session 1 and session 2, it seems that Participant 1's frustration level may have been an anomaly. But, both Participant 3 and 4 both have had an anatomy and a physiology class. Their more advanced knowledge base may be why they did not exhibit frustration. Further testing is required to confirm.

Deviations

For Task 3, Participants 1, 3 and 4 followed the navigation path to Anatomy of the Heart rather than selecting the Color icon on the tabs, but this path was not completed; and hence, they were given a

blank piece of paper. Participant 3 wrote: “I would expect to find a picture of the heart that can be rotated in 3-D so I could move it to see different angles. I would also expect that I could dissect the heart to see the inside. I would expect to be able to click on specific structures and have it zoom in to give more information about the anatomy and physiology of that specific part of the heart.” And Participant 4 wrote: “I would think that this link would lead me somewhere similar to what Bloodflow through the heart lead me in the sense that It would have two more sub menus one with a discussion and the other with diagrams. It would be nice if you can click on the diagrams on each single part of the heart and see how it breaks down than have a quiz or game option that lets me choose the color of the blood (Representing if it has oxygen in it or not). The labeling would be a bit more difficult. I would think there is a drag and drop type option that would let me label each part of the heart.”

On Task 3, Participant 4 wanted to go back to see what was under **Body Basics**. On the prototype I have that menu option grayed out and mistakenly conveyed that the link was not active. Participant 4 answered that it was *Difficult* to complete the task and that it was *Very Difficult* to find the selection. In reference to finding the selection, although it was a closed ended question, Participant 4 wrote: “Because I wouldn’t think that I have to click in a different menu to get to the same topic. I would expect that the diagram would be under the same menu, and once I get to the diagram the color button would appear (sic) next to it. If it is always visible on the bottom it makes it confusing as to when I need it.”

Left Side Bar: Completion of Task, Finding Menu Items, Familiarity of Terms Answers

Table 4A. Participant Responses to Left Side Bar – Completion of Task

Participant	Questions	
	1	3
1	1	N/A
2	1	N/A
3	2	1
4	2	1
Merged Total	8	
Merged Average	1.3	
Merged Range	1	

Table 4B. Participant Responses to Left Side Bar – Finding Menu Items

Participant	Question 2
1	1
2	1
3	2
4	3
Total	7
Average	1.75
Range	2

Table 4C. Participant Responses to Left Side Bar – Familiarity of Terms

Participant	Questions	
	3 (S1)	4(S2)
1	1	N/A
2	1	N/A
3	N/A	1
4	N/A	1
Merged Total	4	
Merged Average	1	
Merged Range	0	

As can be seen by the data, all participants answered *Very Easy* or *Easy* for questions concerning completing the tasks. For finding menu items, they ranged from *Very Easy* to *Neither Easy nor Difficult*. All participants answered *Very Easy* to familiarity of terms.

All participants found the terms very familiar, were able to navigate easily to the web pages, and easily completed the tasks.

Tabs: Completion of Task, Finding Menu Items, Familiarity of Terms Answers

Table 5A. Participant Responses to Tabs – Completion of Task

Participant	Questions			
	6	5	7	9
1	1	N/A	N/A	N/A
2	1	N/A	N/A	N/A
3	N/A	1	1	1
4	N/A	4	2	2
Merged Total	13			
Merged Average	1.625			
Merged Range	3			

Table 5B. Participant Responses to Tabs – Finding Menu Items

Participant	Questions
-------------	-----------

	4 (S1)	6(S2)
1	1	N/A
2	2	N/A
3	N/A	1
4	N/A	5
Merged Total	9	
Merged Average	2.25	
Merged Range	4	

Table 5C. Participant Responses to Tabs – Familiarity of Icons

Participant	Questions	
	5 (S1)	8(S2)
1	2	N/A
2	2	N/A
3	N/A	1
4	N/A	1
Total	4	2
Average	2	1
Range	0	0

All Participants had a harder time finding the menu items – none of the participants looked to the tabs until they had exhausted the left side bar menu options. But once they found the correct tab, they easily completed tasks. All participants found the **At the Clinic** icon to be familiar.

Task 3 was the first task to involve the tabs in the lower right bottom of the page – **Color**. In particular, Participant 1 *sighed* and mentioned “This is hard”. Participant 2 was more frustrated than participant 1. This is probably because participant 2 had a higher level of anxiety from the beginning of the evaluation. I would have expected both participants to select a higher rating. Neither Participant 3 nor 4 showed frustration with this task. But Participant 4 rated completion of the task as *Difficult* and finding menu items as *Very Difficult*. Although the question concerning finding menu items was closed ended, Participant 4 wrote the comment: “Because I wouldn’t think that I have to click in a different menu to get to the same topic. I would expect that the diagram would be under the same menu, and once I get to the diagram the color button would appear (sic) next to it. If it is always visible on the bottom it makes it confusing as to when I need it.”

The task associated with question 5 (session 1) and question 8 (session 2) was under the **At the Clinic** tab. This is an icon I designed myself. Participants answered that the familiarity of the icon was *Very*

Easy or Easy. The task involved finding the page with a clinical condition, Congestive Heart Failure. Both participants 1 and 2 looked to the left side bar first before realizing that it would not be found there.

By the time they got to the task involving **Quiz**, they were very familiar with the tabs and completed the task very easily.

Closed-ended Question Answers

Table 6. Participant Responses to Post-task questions 7 through 10

Participant	Questions			
	7/1	8/2	9/3	10/4
1	1	1	1	2
2	2	2	1	1
3	1	1	1	1
4	2	3	2	2
Total	6	7	5	6
Average	1.5	1.75	1.25	1.5
Range	1	2	1	1

The averages for all participants for these four measurements were *Easy* to *Very Easy*; they found the website easy to use, they were able to easily navigate, and they found the terms and icons to be familiar. Only Participant 4 answered outside the range of *Easy* to *Very Easy* for any of the questions; Participant 4 answered *Neither Easy nor Difficult* for navigation of the website.

Participant Wrong Menu Choices

While each participant was completing each task, I logged the number of wrong menu choices. (In session 1, I also logged the number of correct menu choices so that the participants would not be able to figure out if I was keeping track of wrong responses or correct responses. This data was meant to be a throwaway and will not be presented or discussed.) Table 6 summarizes the wrong choices participants made for each task.

Completion of tasks 1 and 2 involved navigation of the left side bar. Completion of tasks 3 through 5 involved the special function tabs.

As can be seen from the data, the participants were able to directly navigate to the appropriate page to complete the task without error.

The participants made more errors when they were required to use the tabs.

Task 3 Task 3 called for the **Color** special function. This task was the first task to use the tabs. Participants 1 and 2 hesitated and considered the left navigation side bar first. Participants 3 and 4 did not hesitate, but immediately chose to navigate from the left sidebar; both chose Anatomy of the Heart. That page was not developed, so they were given a blank page. After all the choice(s) on the sidebar were wrong and they could not find another option that made sense, all participants looked around the page and found the tabs. Once they found the tabs, they found the **Color** option easily.

Task 4 Task 4 involved finding the page on the website that discusses Congestive Heart Failure. Participants 1, 3 and 4 remembered the tabs and were able to navigate directly to the page. Participant 2 did not recognize that the task involved a clinical condition; three incorrect menu choices from the left sidebar were made before the correct tab was identified. The third, and last, of the wrong menu choices, **Contraction of the Heart**, was not developed. I gave the participant a blank piece of paper. The participant said “I don’t know what I’d expect here” and wrote “nerves + how blood pumps” with the verbal comment “this is probably wrong”. I think that perhaps the fact that Participant 2 did not recognize Congestive Heart Failure as a clinical condition is due to inexperience. Since Participant 2 is the only one who had difficulty with this task, I don’t think the icon and tab name need to be modified; but more testing is required.

Task 5 This task involved finding the **Quiz** special function. All participants remembered the tabs and navigated directly to it.

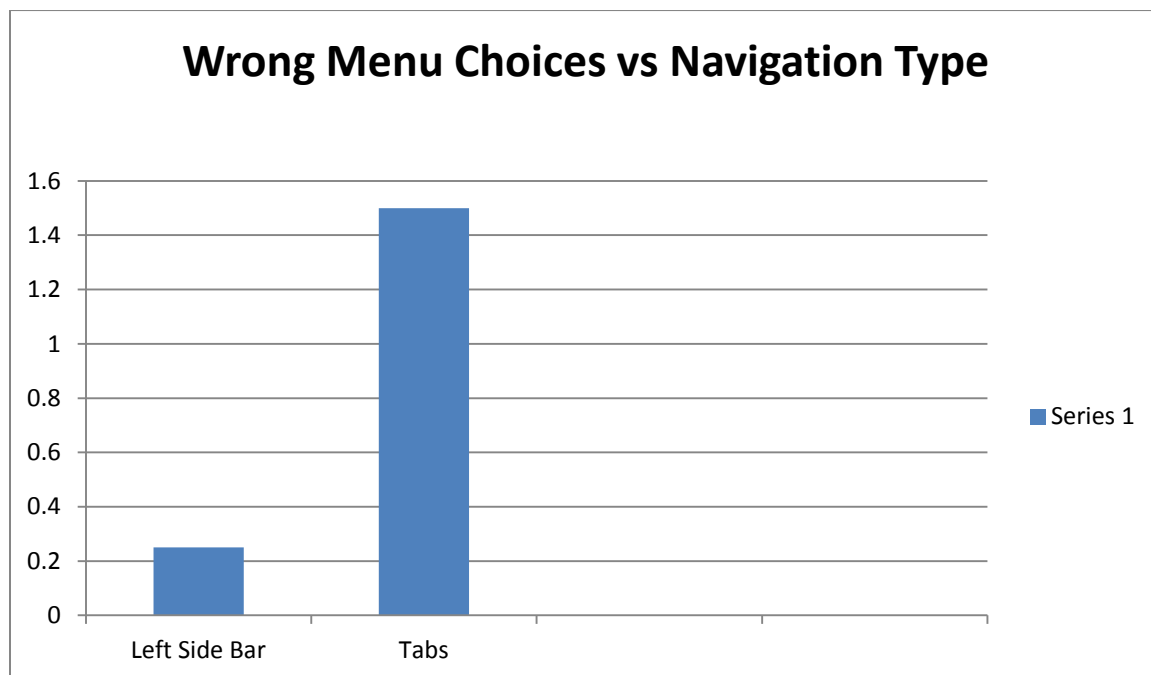
Participant Wrong Menu Choices for Left Side Bar versus Tabs

Table 7 shows the average wrong menu choices for tasks grouped by type – left side bar and tabs. Chart 1 shows the relationship between wrong menu choices for tasks involving the left side bar versus the tabs.

Table 7. Participant Wrong Menu Choices for all Tasks

Participant	Tasks	
	1-2	3-5
1	0	2
2	0	4
3	1	0
4	0	0
Average	.25	1.5

Chart 1. Wrong Menu Choices versus Navigation on Left Side Bar and Tabs



Participant Wrong Menu Choices versus Response to Post-Task Questions Responses

Table 8 shows the correlation between the average wrong menu choices and the response to post-task questions for each task.

Table 8. Average Participant Wrong Menu Choices for all Tasks vs. Average Post-Task Questions Responses

Averages	Tasks				
	1	2	3	4	5
Wrong Menu Choices	.25	0	1.5	.75	0
Response to Questions	1.625	1	2.3	1.5	1.25

For tasks 2 and 5 none of the participants made wrong menu choices, and as expected rated the tasks as *Very Easy* to *Easy*. For task 3, the participants made an rounded up average of 2 wrong menu choices and rated the task as between *Easy* and *Neither Easy nor Difficult*. This rating is expected, as at least two wrong menu choices can be expected. Tasks 1 and 4 have similar results; fewer than expected wrong menu choices were made and the average ratings the participants gave the tasks was *Very Easy* to *Easy*.

Graphic Designer Consultation

Quantitative data was not collected during the consultation. The qualitative data collected is presented in the section above, Results.

Participant Comments

Interviews

Two post-evaluation open ended questions were asked of the participants:

Question 11 – What do you like least about the product?

Participant 1 wrote: “Nothing. It was very easy to navigate and understand the terms.”

Participant 2 wrote: “The icons at the bottom don’t really stand out.”

Participant 3 wrote: “I would suggest more pronounced search feature. It might make it easier than having to click each menu item over and over again to get to the specific place you want to be.”

NOTE: For each task, I started them at the web site home page.

Participant 4 wrote: “I thought that the icons should be a bit bigger and more representative, and that you should always have a “back” button for the user. You should also be able to click anywhere in the menu on the left (ie (sic) if your (sic) in Blood flow diagram, you should be able to click on Cardiovascular in the menu on the left). I think there should be more pictures in general and make the top bar with the logo smaller.”

NOTE: Participant 4 caught me off guard. Participant 4 wanted to go back to look at the **Body Basics** page. I gave wrong information – since the menu item was grayed out I mistakenly thought it was not active.

Question 12 – What do you like best about the product?

Participant 1 wrote: “The icons were familiar, and the site was very easy to navigate.”

Participant 2 wrote: “Everything was very organized, and you can find what you’re looking for very easily.”

Participant 3 wrote: “Initially I felt a little confused when using the product but I felt that after exploring it a little it was very easy to understand. I felt that this was one of the strong suits of the product.”

Participant 4 wrote: “I like the one menu that lead (sic) to everything. It was helpful especial (sic) If you had been through it at least once before. I think it is good that there is a link for Glossary and help always available to the user, that gives a feeling of comfort.”

Graphic Designer Consultation

“The grid design of the page is great.”

“I love the icon for Color.”

In reference to icons for discussions and diagrams, “These are too cryptic.” “[Discussion] icon looks like text – better if it were more descriptive [of the discussion], like a heart.”

“Instead of circles, use an irregular shape like an amoeba for the Cross Section icon.”