Website Accessibility for Activity4All

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Abstract

How to Create an Accessible Website that Highlights Activity4All Has to Offer for Individuals with Disabilities

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The purpose of this study was to create an accessible website for a non-profit organization called Activity4All. This study was done in collaboration with Professor Kevin Taylor and two students from the Kinesiology department.

The website has physiology and nutritional information for individuals with disabilities including: Muscular Dystrophy, Multiple Sclerosis, Dysautonomia, and Joint Hypermobility Syndrome. It also includes instructional workout videos that individuals can do at home.

This study includes research about website accessibility and guidelines provided by the World Wide Web Consortium. Checklists were created from research and interviews in order to determine whether or not the website is accessible. Questionnaires were distributed and individuals were asked to rate the website on ease of use.

At the point of this publishing, the URL for this website is to be determined by Cal Poly. It is currently hosted at: http://www.calpoly.edu/~dmpham and will continue to be modified by other students.

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Chapter 1: Introduction and Purpose of Study

As technology continues to develop, most organizations are using the Internet to make their presence known to the public through websites. This information is readily available to most people at anytime, and for the general public, it is easily accessible. Because the Internet is changing the way information is accessed, many State and local governments are using it to offer many services to the public. However, people obtain information differently; for example, people who are blind use screen readers that allow them to hear the content on websites. In an effort to provide accessibility to these individuals, the Americans with Disabilities Act (ADA) requires government institutions to allow equal access to those with disabilities through their websites.

As a government-funded institution, California Polytechnic State University in San Luis Obispo is required to remain accessible to students with disabilities. The information gathered in this study will be applied to the creation of a website for the Cal Poly Kinesiology department called "Activity4All" (A4A) that complies with ADA standards. Activity4All's mission is to provide and promote physical activity for all individuals with various abilities through inclusive, community-based programs. Through the Kinesiology department, as a part of the Science and Transitional Research in Diet and Exercise (STRIDE) initiative, A4A offers modified physical activity programs to the community.

Because A4A's target audience includes those with various disabilities, the website needs to be accessible to all users. This project will study how to create an accessible website that highlights what Activity4All has to offer for individuals with disabilities. One aspect to be considered would be in regard to how the site is navigated. There will be links at the top of the pages that would be designed to allow the user's screen reader to skip the navigation elements and go straight to the content. This would require the information to flow in a logical manner. The pages would still contain all of the content when the styles used to format the pages are turned off, which means that the images need to have accurate

and detailed descriptions embedded. This project will be done in collaboration with a group of students in the Kinesiology department. The purpose of this study is to create a dynamic website that is complies with ADA requirements and is accessible to all users, including those with impaired vision who use screen readers.

Chapter 2: Literature Review

The Americans with Disabilities Act (ADA) requires that government-funded facilities to "provide qualified individuals with disabilities equal access to their programs, services, or activities unless doing so would fundamentally alter the nature of their programs, services, or activities or would impose an undue burden" (2007). State and local governments' websites are included under "services," which requires extra consideration to ensure accessibility to individuals with disabilities. The online tool kit provided by the ADA states that an organization can offer different services for accessibility if their website does not comply with the ADA requirements such as a "staffed telephone information line" (2007).

There are several websites that list the guidelines to creating a website that is ADA compliant, and by using those tips and tools, the web content is more easily accessible to not just users with disabilities but all users. An article written by Barbara Leporini and Fabio Paternò called "Applying Web Usability Criteria for Vision-Impaired Users: Does It Really Improve Task Performance?" mentions that "accessibility is aimed specifically at making web sites more available to a wider population of users (including special categories) by removing the technical barriers that prevent access to the information included in the site" (2008). When creating an accessible website, several different disabilities need to be considered including, but not limited to, impaired vision and hearing. Providing accessible services not only allow individuals with disabilities to access information, it also allows them to partake in activities and services they would not have been able to participate in such as online shopping.

The World Wide Web Consortium (W3C), an international community that creates protocols and guidelines that ensure the long-term growth of the Web, created the Web Content Accessibility Guidelines which lists a few instances in which accessibility issues could arise (W3C, 1999). Individuals with impaired vision may have difficulty reading

small text or text with certain colors. They may not be able to see the information at all, in which case they would be using a screen-reader to access the information. They may have trouble reading or comprehending text, or they may have difficulties understanding the information provided. Accessibility does not strictly apply to those with disabilities; it can also include language barriers. (W3C, 1999) The article offers fourteen guidelines to follow when creating a web site in HyperText Markup Language (HTML), the markup language for web sites, to allow more accessibility:

1. "Provide equivalent alternatives to auditory and visual content." For images and sounds, descriptive text should also be available.
2. "Don't rely on color alone." In some instances, people who cannot differentiate colors will have difficulty interpreting information if it is presented in different colors.
3. "Use markup and style sheets and do so properly." Using HTML markup incorrectly can cause confusion for the screen readers. For example, a header tag should only be used for headers and not to make certain text larger.
4. "Clarify natural language usage." The HTML code should specify the main language being used so the screen reader would be able to pronounce the information correctly.
5. "Create tables that transform gracefully." Tables should only be used to present data; they should not be used to create the page layout. Doing so would present information incorrectly to screen readers.
6. "Ensure that pages featuring new technologies transform gracefully." The website should be organized in a way that the information can still be accessed correctly with style sheets turned off.
7. "Ensure user control of time-sensitive content change." If there is

information that changes during a certain time period, make sure the user can stop the animation so they can access the information.

8. “Ensure direct accessibility of embedded user interfaces.” If an object has its own interface that the user is supposed to interact with, ensure that the interface itself is accessible.
9. “Design for device-independence.” Some users don’t use a keyboard or a mouse to navigate. In order to accommodate these users, have text that allows them to navigate.
10. “Use interim solutions.” Consider older software and their functions when creating the website. Some assistive technologies read the information differently.
11. “Use W3C technologies and guidelines.”
12. “Provide context and orientation information.” Providing context allows the user to easily navigate through the information without becoming confused.
13. “Provide clear navigation mechanisms.” Navigation should be clear and self-explanatory, allowing the user to easily find the information they need.
14. “Ensure that documents are clear and simple.” (W3C, 1999)

These guidelines can be found in the Web Content Accessibility Guidelines in more detail.

In addition to the guidelines provided by the W3C, it is important to remember that users with disabilities constantly use different types of assistive software and hardware to use computers. The ADA article titled “Website Accessibility Under Title II of the ADA” describes several assistive technologies including screen readers, refreshable Braille displays, and custom browser settings. A screen reader allows an individual with impaired vision to listen to text. However, these screen readers cannot “read” pictures, even if there

is text inside the image (ADA, 2007). That is why it is important to have alternate text in the code that describes the image.

Once a web site is created, there are verification methods, which include automatic programs and user reviews, to ensure that the web site is functional and accessible. The validation programs review the HTML and Cascading Style Sheets (CSS), a style sheet language applied to the HTML, In the article "Condition of Web Accessibility" written by Tanja Krunic and Ljiljana Ruzic-Dimitrijevic, Krunic lists some methods for validation:

1. "Use an automated accessibility tool and browser validation tool."
2. "Validate syntax." The W3C has a markup validation service available at http://validator.w3.org/ that checks for errors in the HTML and broken links.
3. "Validate style sheets." The W3C also offers a CSS validation service, which can be found at http://jigsaw.w3.org/css-validator/
4. "Use a text only browser or emulator." By removing the images, one can see if the information is presented in a way that flows and is easy to follow.
5. "Use a multiple graphic browser simulating the following situations: sounds and graphics loaded, graphics not loaded, sound not loaded, no mouse, frames, scripts, style sheets and applets not loaded."
6. "Check the page in several browsers, old and new." It is important to view the web site in various browsers to check if the information is displayed correctly.
7. "Use some available assistive technologies." Using screen readers such as ZoomText or JAWS can be used to determine if the information is presented in a way that is understandable for users.
8. "Use spell and grammar checkers."

9. “Review the document for clarity and simplicity.”
10. “Let people with different types of disabilities review the document.” By having those with disabilities use the web site, user habits and difficulties can be addressed and used to improve the web site. (Krunic, 2007)

These suggestions combine both automatic methods and user input to increase accuracy. Krunic explains that there are advantages and disadvantages to using both methods giving an example saying, “an automated validation method can check if an image is followed with ‘alt’ text, but it cannot realize if the text is an appropriate explanation of the given image or not. On the other hand, the human review is very slow, but it can help ensure some issues like clarity of language and ease of navigation” (Krunic, 2007).

Chapter 3: Research Methods

The purpose of this project is to work with Professor Kevin Taylor and two students from the Kinesiology department to develop a website for their organization called Activity4All (A4A) that is compliant with the Americans with Disabilities Act standards for web design. Professor Taylor has already created activities for people with disabilities including an adapted canoe club and assisted bicycling. I met with Professor Taylor a few times to go over his expectations for the website. His goal is to work with students to create a website that can be used as a resource for individuals with disabilities. The website is intended to host videos, workout regimens, and nutritional guidelines for those who cannot or do not want to go out to the gym. It is aimed at being an activity central for the disabled or impaired. Kinesiology students working on their senior project have already researched and created workout videos. This project used historical research to create an accessible website that will host the information the Kinesiology students created. In order to determine whether the website is accessible, I used Historical and Descriptive Research, Elite and Specialized Interviewing and Content Analysis.

Before creating the website, I did Historical and Descriptive Research which involves using information from a past research to better understand what I needed to do for my project. I researched what the ADA standards are for website design. However, there were no set requirements other than accessibility. The Worldwide Web Consortium provides guidelines on what to consider when designing a site. These guidelines were helpful when creating the basic skeleton for the website.

In addition to my online research, I conducted Elite and Specialized Interviewing which requires asking industry professionals open-ended questions to gather information. I spoke with Marya Figueroa, Cal Poly's Website Developer and Strategist who has experience in creating accessible websites, about creating an accessible website. She gave me basic instructions on how to design a website that is ADA compliant. She expanded on

the guidelines that the W3C presented based on her own experience. She also listed some additional references that I used when creating the website.

Once I created the website, I conducted Descriptive Research with case studies with the Kinesiology students. Users were contacted through the Cal Poly Disability Resource Center, Professor Taylor's other classes, and personal contacts. We had the users test the website in order to determine if there are areas on the site that need to be altered for better access. For users with impaired vision, we had them use both JAWS and Zoom Text. This allowed us to see how they navigate through the content. With the information from the case studies, I adjusted the website to increase the ease of use.

I also reviewed the different programs used to access information on the web such as screen readers. I researched some software such as JAWS and Zoom Text. Those two programs offered free trials which allowed me to understand how to ensure a site is fully accessible to users with visual disabilities.

I used Content Analysis as a method used to quantify qualitative information collected from my Historical Research, Elite and Specialized Interviewing, and Descriptive Research. As I created the web site for A4A, I used this checklist provided by the W3C that I discovered in my Historical Research:

In General	**N/A**	**Yes**	**No**
Provide a text equivalent for every non-text element			
Ensure that all information conveyed with color is also available without color			
Clearly identify changes in the natural language of a document's text and any text equivalents			
Organize documents so they may be read without style sheets			
Ensure that equivalents for dynamic content are updated when the dynamic content changes.			
Until user agents allow users to control flickering, avoid causing the screen to flicker.			
Use the clearest and simplest language appropriate for a site's content.			

For Images	N/A	Yes	No
Provide redundant text links for each active region of a server-side image map.			
Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape.			
For Applets and Scripts	**N/A**	**Yes**	**No**
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.			
For Multimedia	**N/A**	**Yes**	**No**
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.			
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.			
If all else fails…	**N/A**	**Yes**	**No**
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.			

(W3C, 1999)

In addition to those points provided by the W3C, Marya offered more key points to remember when designing a web site. I created an additional checklist that I used to check my web site:

Final Check	N/A	Yes	No
Separate content (HTML) from styling (CSS)			
Text should be read easily (in other words, no content out of order)			
If text is in a graphic, Javascript or Flash there must be a text equivalent			
The site should work with Javascript turned off			
The site should work if user doesn't have Flash			
The site should work if user doesn't use a mouse			
The site should work if user doesn't have speakers			
Should not have duplicate "More Info" or "Click Here" links			
Labels: Forms and tables need proper labels			

When conducting our case study, the Kinesology students and I had users with various disabilities use the Activity4All web site. After giving them ten minutes to view the information, we asked them to rate their experience using this questionnaire:

1. Is the site's navigation easy to understand?
2. Is the site's navigation consistent?
3. Does the site use consistent and appropriate language?
4. Does the site have any broken links?
5. Did you have any difficulty accessing the information?
6. Do you have any other comments?

For students using assistive technologies, we had them answer additional questions about their experience. We used the following table to determine areas of the web site that needed to be addressed:

Software	**Easy to navigate**	**Had difficulties**	**Comments**
JAWS			
ZoomText			
Other			

Chapter 4 – Results

The success of this project mostly relied on how easily individuals with disabilities can navigate through the Activity4All website. Not only does it need to be accessible to those who browse the Internet differently, but because provides activities and information for those with disabilities – including Muscular Dystrophy, Multiple Sclerosis, Joint Hypermobility Syndrome, and Dysautonomia – the information needed to be presented clearly.

In order to determine if the website met ADA standards, a checklist provided by the W3C was used while creating the pages. This checklist is located in Appendix A on page 20. Another checklist created from an interview with Cal Poly's Web Developer and Strategist Marya Figeroa which can be found in Appendix A on page 21. Each site was reviewed by other individuals and modified until the qualifications were met. Once a majority of the pages were completed and reviewed for accessibility, they were tested for browser compatibility. Based on information provided about browser statistics, it shows that the majority of the browsers used include Internet Explorer 7-9, Google Chrome 10.0, Safari 5, and Firefox 3.6 and 4.0. When testing for browser compatibility, the website was tested on both PC and Mac systems, using multiple browsers.

The website was then tested by students and other individuals with disabilities. They were asked to fill out a questionnaire about the website after viewing it in the browser of their choice. Some students used screen-reader programs called ZoomText and JAWS to browse the website. The questions and results of the survey are included below:

1. *Is the site's navigation easy to understand?*
2. *Is the site's navigation consistent?*

   Overall, the feedback received from these two questions was positive. The navigation was consistent and fairly self-explanatory. The students using screen-readers were able to navigate through the website easily. The only

suggestion regarding navigation was to make the main navigation a drop-down menu with options for the other pages.

3. *Does the site use consistent and appropriate language?*

   Most of the language used in the content was easy to understand. This question was mainly used to determine if the content flowed in a manner that can be easily followed.

4. *Does the site have any broken links?*

   This question revealed a few navigation issues with anchored links. There were some links that did not skip to the correct section. These issues were easily resolved by renaming the anchored links.

5. *Did you have any difficulty accessing the information?*

6. *Do you have any other comments?*

   The majority of the responses to these two questions showed that the information on the workout pages should be split up into multiple pages. Users wrote that because the workouts had many exercises, they felt that it would be easier to split the three levels of difficulty into different pages. See Appendix C for a screenshot of the workout page.

This questionnaire can be found in Appendix B, on page 22.

Overall, the general design of the website was clean and easy to navigate using multiple browsers. Many of the responses were regarding minor changes to the navigation menu. The main importance was that the information was accessible to all users.

Chapter 5 – Conclusion

This purpose of this study was to create an accessible website for an organization called Activity4All (A4A) that offers physiological and nutritional information as well as workout routines created for individuals with Multiple Sclerosis, Muscular Dystrophy, Joint Hypermobility Syndrome and Dysautonomia.

Chapter One mentioned that as a government-funded institution, Cal Poly must be accessible to all students and faculty under the Americans with Disabilities Act. Because A4A is a Cal Poly organization, its website needed to be ADA compliant. Therefore, ease of use was the most important aspect of this project. The design for the website was simple and clean, focusing on the information created by a group of Kinesiology students. Information gathered and discussed in Chapter Two was used to create checklists to validate the HTML markup for the website. The Content Analysis done in Chapter Three was helpful when reviewing the website to ensure that it is ADA compliant. Screenshots of the website can be found in Appendix C.

Initially, there were plans to have a large group of students browse the website in a room and provide immediate feedback. However, short e-mail surveys were sent out with questions, that can be found in Appendix B, about the website. The answers to the survey questions were then used to improve the website, but the overall response was positive. The website is not fully completed, and is meant to be a continuous project for students to add new information and modifications. The results and suggestions gathered from the surveys would be used to improve the website.

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chap5toolkit.htm>

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Appendix A – Checklist

Checklist created from suggestions found on the World Wide Web Consortium website:

In General	**N/A**	**Yes**	**No**
Provide a text equivalent for every non-text element			
Ensure that all information conveyed with color is also available without color			
Clearly identify changes in the natural language of a document's text and any text equivalents			
Organize documents so they may be read without style sheets			
Ensure that equivalents for dynamic content are updated when the dynamic content changes.			
Until user agents allow users to control flickering, avoid causing the screen to flicker.			
Use the clearest and simplest language appropriate for a site's content.			
For Images	**N/A**	**Yes**	**No**
Provide redundant text links for each active region of a server-side image map.			
Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape.			
For Applets and Scripts	**N/A**	**Yes**	**No**
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.			
For Multimedia	**N/A**	**Yes**	**No**
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.			
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.			
If all else fails…	**N/A**	**Yes**	**No**
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.			

Final checklist created from interview with Marya Figeroa:

Final Check	N/A	Yes	No
Separate content (HTML) from styling (CSS)			
Text should be read easily (in other words, no content out of order)			
If text is in a graphic, Javascript or Flash there must be a text equivalent			
The site should work with Javascript turned off			
The site should work if user doesn't have Flash			
The site should work if user doesn't use a mouse			
The site should work if user doesn't have speakers			
Should not have duplicate "More Info" or "Click Here" links			
Labels: Forms and tables need proper labels			

Checklist created for sight-reader software:

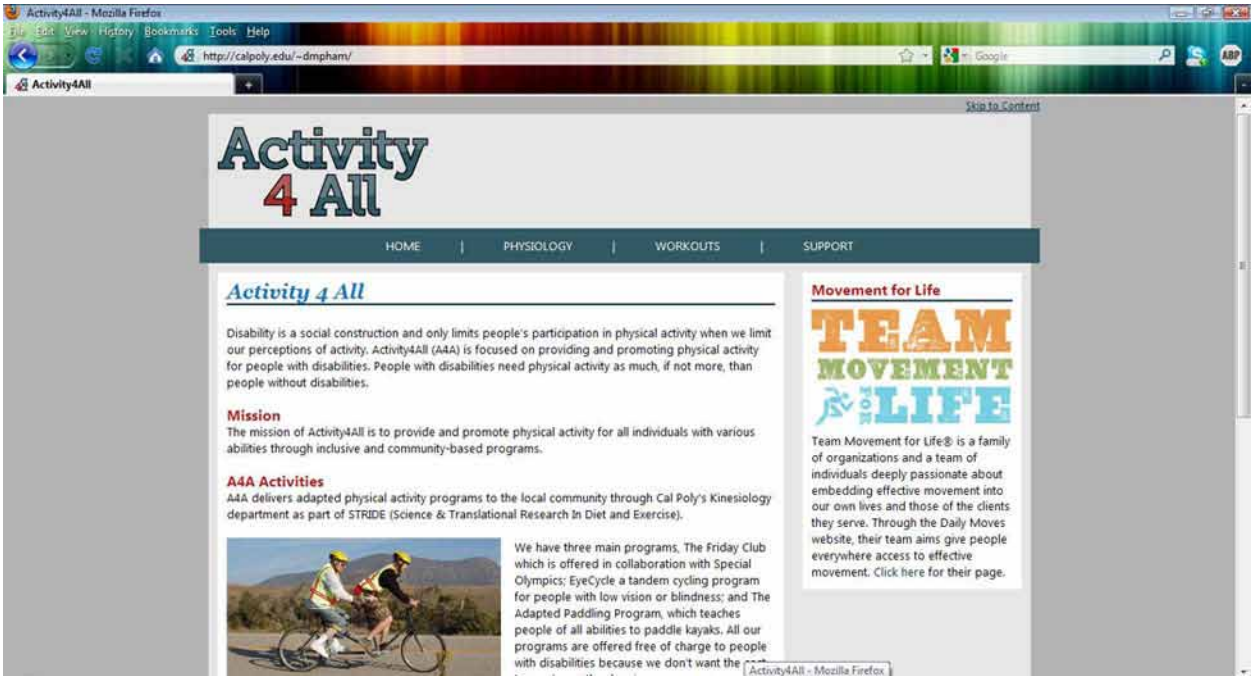
Software	Easy to navigate	Had difficulties	Comments
JAWS			
ZoomText			
Other			

Appendix B – Questionnaire

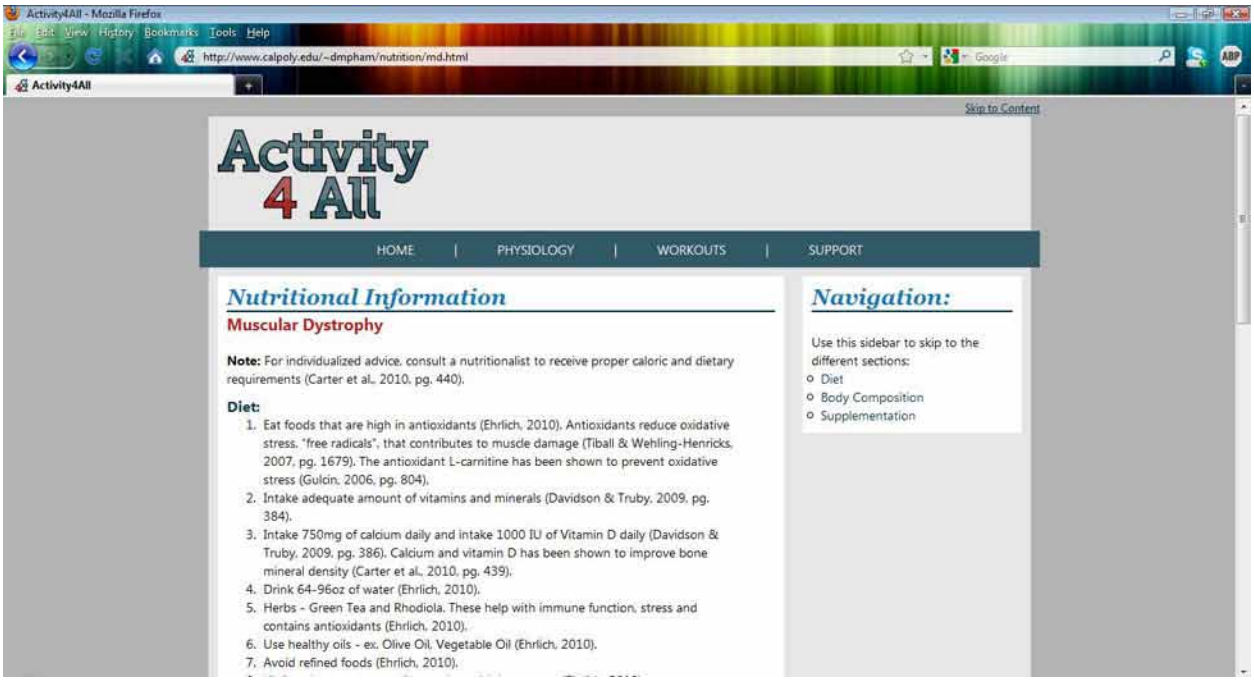
1. Is the site's navigation easy to understand?
2. Is the site's navigation consistent?
3. Does the site use consistent and appropriate language?
4. Does the site have any broken links?
5. Did you have any difficulty accessing the information?
6. Do you have any other comments?

Appendix C – Screenshots

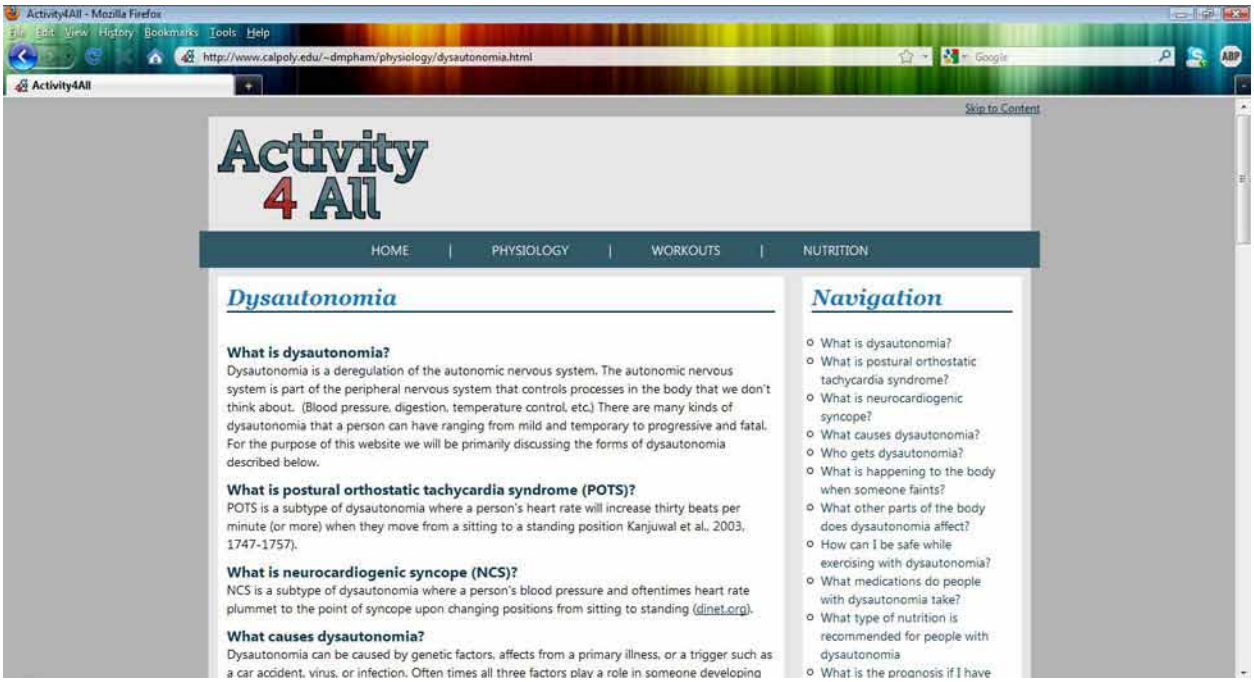
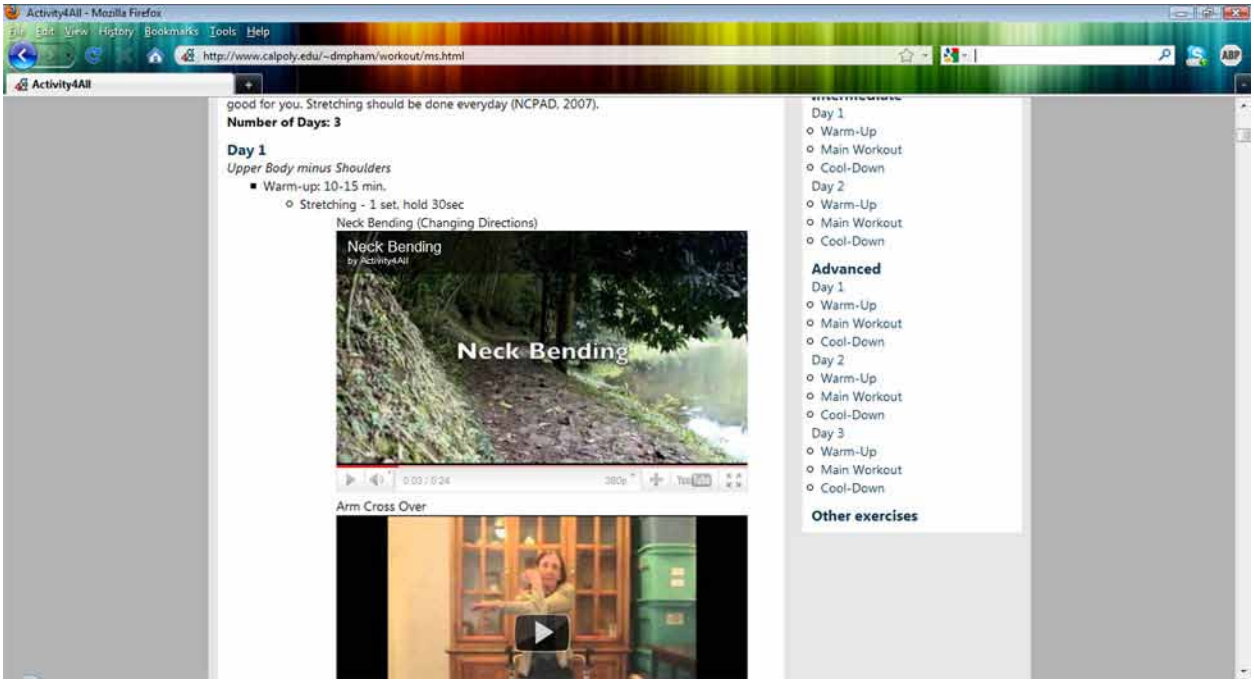
Activity4All homepage:



Activity4All nutritional information page for Muscular Dystrophy:



Activity4All physiology information page for Dysautonomia:



Activity4All Workout page for Multiple Sclerosis: