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Accessibility Across the Curriculum: An OER Website on Accessibility

Amy Wolfe
The Graduate Center, City University of New York

ACCESSIBILITY ACROSS THE CURRICULUM: AN OER WEBSITE ON ACCESSIBILITY

by

AMY WOLFE

A master's capstone project submitted to the Graduate Faculty in Liberal Studies in partial fulfillment of the requirements for the degree of Master of Arts,
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This manuscript has been read and accepted for the Graduate Faculty in Liberal Studies in satisfaction of the capstone project requirement for the degree of Master of Arts.

Date	David Chapin Capstone Project Advisor
Date	Elizabeth Macaulay-Lewis Executive Officer

THE CITY UNIVERSITY OF NEW YORK

ABSTRACT

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Advisor: David Chapin

This white paper shares my process for creating my OER website ***Accessibility Across the Curriculum***, located at https://accessibilityacrosscurriculum.awolfeworks.com. This OER website is an Open Educational Resource (OER) learning object (LO) and LO repository, conceived as a resource to increase general knowledge on accessibility and increase the teaching of accessibility. The UN Convention on the Rights of Persons with Disabilities recognizes access to information and communications technologies, including the Web, as a basic human right. One of the various definitions of Digital Humanities (DH) focuses on how DH integrates teaching and the use of technologies, online platforms, research methods, and media. Open educational resources, OERs, are DH tools which have a real impact on the knowledge of our society by sharing information and knowledge openly and freely (depending on licenses). OERs are the learning target of thousands of students around the world and encourage students to utilize educational resources more actively. This OER on accessibility and how to create accessible content grew out of the desire to impact information sharing, learning and teaching by increasing accessibility universally.

The World Wide Web Consortium (W3C), their guidelines, the Web Content Accessibility Guidelines (WCAG) and the four main accessibility principles known by the acronym POUR (perceivable, operable, understandable and robust) are discussed and demonstrated throughout

the site. The OER website also provides foundational information on accessibility best practices such as closed captioning, alternative text (alt-text), color contrast and audio descriptions.

In this white paper I discuss the theoretical methodology and frameworks I used in the creation of my work as well as the creative process and technical decisions I made to ensure accessibility.

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As I sit here putting the finishing touches on my capstone I cannot help but reflect back on my journey towards this accomplishment and all the people who helped and encouraged me along the way. This would not be possible without all the help I received from many people whom I must thank. Thank you to the Graduate Center and CUNY for providing me with the opportunity to continue my educational studies. Thank you to all the CUNY libraries and librarians, I know none of the scholarship which goes on at CUNY could be done without all the work you do. Thank you to the MALS department for creating an environment where academic curiosity is encouraged and supported. Matt Gold for introducing me to Digital Humanities. Kathy Koutsis for your friendship and ALL the work you do for the department and all the students. Our talks in your office and outside the Grad Center provided me with a sense of community. Elizabeth Macaulay-Lewis, you were my first professor at MALS and I couldn't have been luckier, you are a great professor. Your door was always open and you were available to talk and to listen to my anxieties and my excitement. Thank you David Chapin! You have been a fantastic advisor. Your questions, insights, suggestions and encouragement pushed me through. Thank you to my mom Maxine Wolfe for all your support and help. Your cheering and encouragement motivated me when I was stuck. Thank you to my best friend Sarah Sexstone. Our friendship and your support both personally and professionally (as a fellow librarian) were integral in my finishing. Thank you for reading my work, looking over all iterations of my site and giving me constructive criticism. Finally I need to thank the late Cindy Lobel my original advisor. Cindy died of breast cancer on October 2, 2018. Cindy was a great professor and a wonderful woman who inspired me. Thank you to everyone who helped and supported me in this journey. Woo Hoo! I'm done! Enjoy! And remember – always consider accessibility!

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PROJECT MANIFEST

1. Whitepaper (.PDF file)

   Accessibility Across the Curriculum: An OER Website on Accessibility. Provides a detailed project summary.

2. The live OER website Accessibility Across the Curriculum can be accessed at the following URL address: **https://accessibilityacrosscurriculum.awolfeworks.com**/

3. WARC files: archived version of the OER website saved using webrecorder.io

CAPSTONE PROJECT

My capstone project, to fulfill the requirements for the degree of Master of Arts, is the open educational resource (OER) website Accessibility Across the Curriculum. My capstone project is located at the url: **https://accessibilityacrosscurriculum.awolfeworks.com/**. The capstone website is an open educational resource (OER), licensed under Creative Commons Attribution-Non Commercial-ShareAlike 4.0 International License. This accompanying white paper will discuss the impetus for the capstone site project, the theoretical framing and methodology used, along with an evaluation of the final capstone OER site Accessibility Across the Curriculum.

INTRODUCTION

Impetus for Capstone

In January 2019 I attended several workshops put on by NYCDH (New York City Digital Humanities) during NYCDH Week 2019. NYCDH is a group made up of "*scholars and members of the GLAM (galleries, libraries, archives, museums) community"* (NYCDH, 2019) who gather around digital humanities. Since the focus for my MA Degree is Digital Humanities (DH) these workshops were perfect for me to attend. The workshops I attended were fascinating and enlightening, and it was exciting to see all the digital humanities work being done. However one thing stuck out to me regarding several of the workshops I attended. The DH projects being discussed/demonstrated were not accessible and accessibility was not a topic of consideration in their creation. This lack of accessibility considerations were even more perplexing considering other workshops were specifically about DH and accessibility.

The topic of accessibility is not new in the DH field but for some reason accessibility considerations are not always incorporated into DH projects and teaching. Why are people not thinking about accessibility when creating projects and teaching? All projects and tools do not need to be 100% accessible but to not consider accessibility, to not mention that people are aware what they are producing is inaccessible is unfortunate. Thinking about my graduate studies I realized digital accessibility was never a topic of conversation or teaching, even in classes where digital tools were used and/or taught. This got me thinking about two free New York Public Library (NYPL) TechConnect coding courses I took back in 2015. The two 12-week coding courses, called Project Code Phase I and Phase II were free programs for those who wanted to learn coding and programming. The programs were (and continue to be) fantastic and provide great foundational information on coding and programming which people can take into their lives and jobs. However, accessibility was not covered in these courses either.

This continued lack of accessibility education and considerations, across various types of educational experiences, bothered me. I wanted to figure out a way to teach accessibility to as many students and people in general, and to make sure economics was not a limitation to learn these lessons. When I asked myself "how could I help teach people to consider accessibility when creating content, working at their jobs, in their lives etc.?" and "how can I reach the most people, where cost was not an issue, with these lessons on accessibility?" the creation of my open educational resource (OER) capstone website Accessibility Across the Curriculum was my answer. Doing this capstone OER allowed me to combine my graduate studies in digital humanities, my passion and work in technology and my work as a Librarian focusing on providing access to information to as many people as possible in as many formats as possible.

Aims of Capstone Project

The aims of this capstone are to expand knowledge of accessibility by creating an open educational resources (OER) web site on accessibility which can be used to learn and teach about accessibility. Neil Butcher of UNESCO defines of OER as

> *"any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or license fees"* (Butcher, 2011).

This capstone OER site will combine information on the ethical, legal and historical reasons for taking accessibility into consideration. The site will teach about the history of accessibility, the legal fights for accessibility, accessibility laws and explaining how everyone can benefit when accessibility is taken into consideration while also providing technical information on how to produce accessible content. The site's blog will be used as a Learning Object/Assignment repository where professors can find learning objects/assignments they can use in their courses, across the curriculum, to teach students about accessibility. By incorporating accessibility into all subjects and teaching students to always consider accessibility, their knowledge of accessibility will increase, which they can take with them out into the workforce. This will in turn increase accessibility universally.

Capstone Site URL

The capstone OER site this whitepaper refers to, Accessibility Across the Curriculum can be found at the url https://accessibilityacrosscurriculum.awolfeworks.com/

THEORETICAL FRAMING AND/OR METHODOLOGY USED

Theoretical Framing

In 2011 Neil Butcher, writing for UNESCO (The United Nations Educational, Scientific and Cultural Organization) created "A Basic Guide to Educational Resources". The guide discussed how OERs have the potential to improve the quality and effectiveness of education. In his 2016 article, Hilton summarized several efficacy and perception studies on OER which showed people benefit from OERs in terms of improved learning outcomes, pedagogical changes and learning experiences. Lin and Wang in their 2018 research on OER, found OERs to be useful in teaching and learning and the open access to the OERs encouraged students to utilize educational resources more actively. Bliss et al. found OERs increased students' engagement with course materials (Bliss et al., 2013a &b). I envision this capstone OER to be a place where students, teachers and the general public can engage with information about accessibility.

Tim Berners-Lee, the inventor of the World Wide Web and the Director of the World Wide Web Consortium (W3C) stated "*The social value of the Web is that it enables human communication, commerce, and opportunities to share knowledge*" (W3C Mission, 2016). In 2018 Norman Youngblood discussed how students in an interactive media curriculum course not only needed to understand accessibility on a legal level but also on an ethical level. Germania Rodríguez studied ways to increase OER usage in higher education as a way to achieve Berners-Lee's goal for the web. According to Rodríguez accessible websites are more usable and the accessibility of an OER website acquires even greater relevance than just a regular website because of OERs real impact on the knowledge of our society, since their contents are the learning target of thousands of students around the world (Rodríguez, 2017). I want to improve

the quality of education by teaching the ethical, legal and technical reasons accessibility should be taught in all fields and courses, across the curriculum.

Methodology used to create capstone site

Since this entire capstone is concerned with accessibility one of my main concerns was to make sure the site and all the content on the site itself is accessible. Accessibility informed all my decisions from platform theme, to color, to links I placed on my site. As Norman Youngblood said in 2018 "*Accessibility cannot be an afterthought. It needs to be part of the creative process.*" The following white paper narrative will walk you through the decisions I made, why I made them, how they benefit accessibility and how I continually evaluated my capstone OER site to make sure it was as accessible as possible.

My first initial decision was to create a WordPress site for my capstone. WordPress is a widely used digital platform which I have experience using in my Digital Humanities classes and in my professional roles as Accessibility Librarian and OER developer. Once the general platform was picked I had to decide between wordpress dot com and wordpress dot org.

There are several differences between wordpress dot org and wordpress dot com. The most important difference is that WP dot com limits users' ability to customize and add plug-ins. Since my site needed to be accessible, I needed to have the ability to customize and fix any accessibility issues and use any WP plugin to enhance accessibility that I wanted. WordPress dot org is free and open source, while wordpress dot com costs money and is not open source. WP dot com provides a hosting platform for your site, WP dot org does not host your site and requires you to purchase a hosting platform for your site. After considering all the differences I chose to create a wordpress dot org site on the hosting platform Bluehost.

Once everything was set up with Bluehost and wordpress dot org I had to go about the process of choosing a template theme on which to create my capstone site. WordPress allows you to search for themes based on specific "feature filters". So from my WP dashboard I choose "Appearance" and then "Themes" and then I chose "Feature Filters" and selected "Accessibility Ready". After applying those filters I then typed in the terms "custom css" and "responsive" in the search box to narrow my choices even further. Custom CSS would allow me the ability to customize the look and feel of my site with code (with or without using a plug-in). The term "responsive" would pull up themes which allowed for responsive web design (RWD). Responsive web design allows websites to "*transform to fit the user's needs and capabilities, considering aspects such as screen size, pixel density, context, bandwidth, and battery life, among others*" (Bollens, 2014).

As I progressed in the design of my capstone site, I continually tried to meet the Web Content Accessibility Guidelines (WCAG) standards. Rodríguez's framework for improving web accessibility incorporated WCAG standards, as did the SUNY Electronic & Information Technology Accessibility Committee in their May 2019 final report, Ismail and Kuppusamy in their 2018 web accessibility investigation case study of college websites, and Cinquin, Cuitton and Sauzeon 2019 systematic review of online e-learning and cognitive disabilities. WCAG was created by the World Wide Web Consortium (W3C), an international community, whose mission is to develop international Web standards which can be used by individuals, organizations, and governments internationally to ensure accessibility.

There are four main guiding principles of accessibility upon which WCAG has been built. These four principles are known by the acronym POUR, "perceivable, operable,

understandable and robust". Many of the technology challenges faced by people with disabilities can be described and solved using one of the POUR principles.

Perceivability means the user can identify content and interface elements by means of the senses. For many users, this means perceiving a system primarily visually, while for others, it may be a matter of sound or touch. Information and user interface components must be presentable to users in ways they can perceive. **Operability** means that a user can successfully use controls, buttons, navigation, and other necessary interactive elements. A user can successfully use assistive technology like voice recognition, keyboards, screen readers etc. **Understandable** technology is consistent in its presentation and format, predictable in its design and usage patterns, and appropriate to the audience in its voice and tone. Users should be able to comprehend the content, and learn and remember how to use the interface. **Robust** means content must be robust enough that it can be interpreted reliably by a wide variety of users, allowing them to choose the technology they use to interact with websites, online documents, multimedia, and other information formats (Big Ten Academic Alliance Information Technology Accessibility Group, 2016).

I searched for the theme design feature ability to have 3 columns, since I wanted to be able to create page specific boxes "tables of contents" so users would be able to easily navigate the site and situate themselves within the site. Doing this was another way in which I was trying to make my site adhere to the U in POUR "understandable".

I also wanted to add an "Accessibility Toolbar" which would allow users to customize various aspects of the capstone OER website. I did an online search for "Accessibility Toolbars" and "Reviews" along with searching in the WP Plugin area. After trying several different plugins I choose "One Click Accessibility" which was created by the WP Elementor team. It is

completely free and adds a number of helpful accessibility features with the minimum amount of setup and without the need for coding knowledge. With this plug-in users now have the ability to resize font, switch to grayscale, negative contrast, high contrast, light background, make all links underlined and change to readable font. The menu visually is fixed/stuck to a portion of the screen (which the web designer can choose) so it appears to scroll up and down while the user uses the site. Importantly though, I was able to customize the size and visual display of the accessibility toolbar so that it doesn't cover any important visual content on the site when viewed with or without assistive technology, such as screen magnification. I will come back to this topic of "fixed" content when discussing navigation menus for the site. "One Click Accessibility" also allows site creators to enable skip to content, add outline focus for focusable elements, remove the target attribute from links (if desired), and add landmark roles to all links for style adjustment. All of these technological tools help the site adhere to WCAG guidelines.

Navigation menus are something I've been rather obsessed with throughout my coding and programming studies and work. As a librarian I know it is important to provide people with as many access points to information as possible and a good navigation menu provides good access points. As a librarian and web developer I also know that the use of cellphones and smartphones is continuing to rise. According to the Pew Research Center, in 2018 96% of Americans adults owned a cellphone, with 81% owning smartphones. Broken down by age 95% of 18-34 year olds and 67% of adults over 50+ owned a smartphone in 2018. Additionally, for a growing share of Americans their smartphones are their primary means of online access at home with one-in-five classified as "smartphone-only" internet users – meaning they own a smartphone, but do not have traditional home broadband service (Pew Research Center, 2019). Making sure my site and site menus were accessible and user-friendly while accessing via a

phone (and other formats) was an important consideration. Navigation menus are a big part of making sure a site is an accessible site, following the POUR accessibility principles.

To ensure accessibility and responsiveness I made sure the theme I chose provided the ability to have an accessible "hamburger menu." A hamburger menu is *"an icon used on a website that, when clicked, opens to reveal a navigation menu. Visually, it's a stack of three horizontal lines resembling a hamburger – top bun, patty, bottom bun*" (Sayles, 2018). Not all hamburger menus however are accessible (Lin, 2019). Part of what the code used to create a hamburger menu does is hide the menu and replace it with an icon on specific sized screens. If, however one does not add additional information to ensure accessibility what will happen is that when we hide the menu links on smaller screens and replace them with an icon, screen readers will only be aware of a 'hamburger', not a menu.

Another accessibility consideration associated with my site's navigation menu had to do with having a fixed/static navigational menu bar. Initially I was looking for a plug-in and theme where I could implement a fixed/static top menu bar. My reasoning being that on long, continuous web pages is hard sometimes to navigate. The length becomes such that users become lost on the site page, are not able to orient themselves on the page and are not able to navigate effectively. A fixed/sticky menu allows a user to always have access to important options, no matter where they are in the content. In my research however I discovered fixed/static navigational menu bars cause some accessibility issues. It turns out fixed/static navigational menu bars pose accessibility barriers for users of screen magnification. While under magnification, the static menu ends up obscuring the site content and renders the site unreadable. Therefore I did not use code make my menu bar fixed. What I decided to do to assist with navigation on long pages was to include a "Back to Top" button, which like the "One

Click Accessibility" toolbar, was small enough to not cause any accessibility issues under magnification.

One of the four main accessibility principles is perceivability. As I stated previously, while the majority of users may perceive my capstone OER visually, not all users perceive websites in the same way. Also, some users while able to perceive my site visually, may find audio content is easier for them to process and understand. I made sure the content on my site was able to be perceived in as many ways as possible, I made sure all my videos have closed captioning and I included links to transcripts for each video and audio clip if available. For example, not only do I provide written information about the 1990 ADA signing by President George HW Bush, I also embedded a closed captioned video of the president signing the ADA, along with an audio only clip of the president's signing of the ADA accompanied with a downloadable transcript of the president's speech while signing the ADA. These different multimodal features allow users to interact with the content in the manner of their choosing. I also provide some videos with video description which not only helps those who are blind or who have low vision but also individuals on the autistic spectrum find they make it easier to understand social cues.

When teaching about accessibility it is important to get buy in by people. One way to increase buy in is to explain how accessibility barriers limit people's ability to use information and how taking accessibility into consideration when creating content and sharing information can help so many different types of people in so many different circumstances. Because of this I examined my site and content from various users' needs and interactions. As content creators, web site developers and instructional media designers etc., it is important to recognize users are not all the same. To that end I wanted to show different accessibility perspectives. The W3C

Web Accessibility Initiative (WAI) created a wonderful series of videos demonstrating different accessibility perspectives. I embedded nine videos which demonstrated such issues as voice recognition, color contrast, keyboard compatibility and button size. I also embedded three videos demonstrating screen readers, braille readers and screen magnification.

An interesting accessibility issue arose when embedding these videos on my capstone OER site. Initially I had designed the site to have these videos display 3 across, in the main content area, when viewed on a desktop display. Mathematically they laid out better being 3 across. However, in this template when I embed 3 videos on the same line the thumbnails created were too small and I found them inaccessible. They had perceivability and operability issues. They did not provide enough discrete area for users to navigate with a mouse or see the controls and tool tips. Additionally, the small area of the thumbnail made it difficult for users to choose how and where they wished to view the videos. It limited users' ability to navigate and view the videos outside of the OER site window. This limitation interfered with the robustness of a site.

Another accessibility check I made was color contrast. Using color thoughtfully and accessibly is one of the main tenets of website design and accessibility. As I was choosing colors for every aspect of the site I kept running the site through various automated accessibility checkers which checked for color contrast. Some of the built in colors did not meet WCAG color contrast guidelines which are "*in regular text, the ratio of the luminosity of the text to the background should be 4.5:1, in large text, the ratio of the luminosity of the text to the background should be 3:1. If text is not important to the content of an image, then there are no requirements about contrast*" (WCAG).

While it was true that making sure my capstone OER site and its content was accessible was one of my main concerns, it was not my only concern when planning and constructing this

OER. It was very important to me that when creating a site to teach about accessibility I made sure to include information about the history of the fight for accessibility and disability rights. To quote Alice Wong, Project Coordinator of the online Disability Visibility Project, "*History gives us a sense of who we are and where we are going. Disability history is so much more than the 'big names' familiar to most such as Helen Keller, FDR, Ed Roberts, Judith Heumann and Justin Dart*". The ADA is 30 years old and the Rehabilitation Act of 1973 (section 504) is over 57 years old. I do not know if people are truly aware anymore of the fight disability activists had to wage to get rights and to end legal discrimination against them. I therefore searched for primary materials to show and teach this history. I found "The Power of 504", an award-winning 18-minute documentary video about the historic civil rights demonstration of people with disabilities in 1977. To increase the video's reach and accessibility I also included links to the Arabic, Chinese, Japanese, Russian, Spanish and English and Vietnamese versions of the same video, all with open captions. I also found the June 1997 audio documentary featuring contemporary media coverage of the 504 Sit-Ins. Presenting information in different modalities (videos, audios, transcripts etc.) is one of the main pillars of accessibility.

While teaching aspects of the history of accessibility activism is important, I also don't want to ignore current activism and discussions which are going on regarding accessibility and disability. The topic of accessibility, representation, rights etc. is broad and wide. I included a few items which cover a small portion of those current activities such as readings on climate change and accessibility, audio on voting rights and accessibility and video on intersectionality and accessibility.

EVALUATION

How strongly does completed version capture my capstone objectives

The aims of this capstone project were to expand knowledge of accessibility by creating a capstone OER web site on accessibility which could be used to learn and teach about accessibility. My completed capstone OER site ***Accessibility Across the Curriculum*** provides students, teachers and the general public an accessible learning object where they can learn about accessibility and technology. The site provides information on the history and current fights for accessibility and disability rights and information on how to create accessible work. The site is accessible and provides information in various formats, in an effort to reach as many users "across the curriculum". In my initial vision of the capstone I had more learning objects/assignments on the site then I currently do now, however since this capstone OER is a live, ongoing project, additional learning objects/assignments will be added in the future.

Setbacks and challenges faced

The whole purpose of this capstone OER is to teach accessibility and to increase accessible content available to all users worldwide. Because of this fact, making sure the capstone site was itself accessible and followed accessibility best practices was of utmost importance. As I discussed in the methodology section, I wanted the capstone to follow WCAG 2.0 guidelines, however I ran into some problems in relation to responsive page flow. My intention is to have the "Page Table of Contents" boxes flow underneath the banner image on smaller screens. Currently my site considers the middle box as the "main content" and I'm not able to customize the flow to set which boxes and areas I want to show on the top of a phone screen. This means that on phones the "Page Table of Contents" shows up after the main content. In addition the plugin I used to embed my video examples is causing some accessibility errors

which I need to address. The thumbnails produced by the plugin are coming up without any alt-text, thus making them non-discoverable by screen readers.

Creating learning objects/assignments which incorporate some facet of accessibility which can be used in various subjects was challenging. Trying to create learning objects for topics or subjects I'm not an expert in caused some issues. One of my solutions was to use my Librarian skills to search out learning objects/assignments already created that reside in the public domain or have been released under an open license that permits no-cost access, adaptation, and redistribution by others (Creative Commons). Any learning object/assignment I link to on my OER site must either be about accessibility and/or accessible itself. I also decided that the section of my OER which houses the learning objects/assignments would be created on a "blog page". This would allow me to add learning objects/assignments on a rolling basis. I would also be able to add "Categories" and "Tags" to each learning object/assignment, allowing users to grab all learning objects connected to a specific category or tag.

CAPSTONE PROJECT FUTURE

The capstone OER ***Accessibility Across the Curriculum*** is a live, on-going OER site which will continue to grow as new learning objects/assignments are added.

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