California Open Online Library for Education & Accessibility

COOL4Ed (the California Open Online Library for Education) was created so that faculty can easily find, adopt, utilize, review and/or modify free and open etextbooks for little or no cost. The COOL4Ed accessibility open textbook evaluations can inform faculty, staff, and students how the free and open etextbooks meet 15 accessibility "checkpoints" that could impact the learning of learners with a range of disabilities.

SUMMARY OF ACCESSIBILITY EVALUATION:

Textbook: **Structure and Interpretation of Computer Programs**
Format of Textbook: **HTML**

Assistive Technology (AT) Evaluation Score: Overall	6.5 (Maximum score = 10)
Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, see list below, are typically not used or available by the general public into the accessibility evaluation process. • Accessibility features of desktop operating systems (e.g. high-contrast display themes, settings from the Keyboard and Mouse control panels) • Accessibility-related software included with desktop operating systems (e.g. VoiceOver, Microsoft Narrator) • Third-party accessibility software and hardware: • Screen readers (e.g. JAWS, Window Eyes) • Magnification software (e.g. ZoomText Magnifier/Reader, MAGIC Pro with Speech) • Reading software for users with learning disabilities (e.g. Read and Write Gold, Kurzweil 3000) • Refreshable Braille displays	
Non- Assistive Technology (NAT) Evaluation Score: Overall	**6.3 (Maximum score =10)**
Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.	

COOL4Ed Accessibility Evaluation Methods:

The California State University Accessible Technology Initiative and MERLOT (Multimedia Educational Resources for Learning and Online Teaching) developed the rubric or "checkpoints" for the accessibility evaluation. CAST, a nationally recognized organization with expertise in accessibility and UDL, reviewed and affirmed the appropriateness and value of the accessibility evaluation rubric and contributed the references and support resources to help people learn how best to design, evaluate, and remediate the learning materials to maximize the accessibility of the learning resources for all. The "checkpoints" have been built upon the Section 508 technical standards and has been organized and tailored to the typical characteristics of digital resources used in higher education courses.

The accessibility evaluations were performed by the Center for Usability in Design and Accessibility at California State University, Long Beach; faculty and graduate students with expertise in human factors, usability, and accessibility performed the evaluations of over 150 free and open etextbooks. COOL4ed.org has published the accessibility evaluation rubric and provides a detailed description of the methodology used to evaluate the accessibility of the etextbooks in COOL4ed.

LOOKING FOR DETAILED ACCESSIBILITY REPORTS?

See Detailed Accessibility Evaluation Report using Assistive Technologies

See Detailed Accessibility Evaluation Report using Non-Assistive Technologies

DETAILED ACCESSIBILITY EVALUATION REPORT using
Assistive Technologies

Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process.   These specialized assistive technologies, such as Kurzweil and NVDA, are typically not used or available by the general public into the accessibility evaluation process.

1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	**Fail**
Additional Information:	**Found the Formal Accessibility Policy for the Merlot II website at info.merlot.org/merlothelp/index.htm#policies_and_ practices.htm but not for the specific textbook.**
B. The organization providing the online materials has an accessibility statement.	**Fail**
Additional Information:	**Found the Accessibility Statement for the Merlot II website at info.merlot.org/merlothelp/index.htm#policies_and_ practices.htm but did not find any information for the specific book.**
C. An Accessibility Evaluation Report is available from an external organization.	**Fail**
Additional Information:	**Found he Accessibility Evaluation Report for the Merlot II website at info.merlot.org/merlothelp/index.htm#policies_and_ practices.htm but did not find it for the specific textbook.**

2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	**Pass**
Additional Information:	**Evaluated Chapter 1. Parts of STEM equations are skipped, all figures were read as tables and not enough information was read to describe the figures**

	(only captions described each figure). Other than the skipped STEM content, all other regular text is read properly and nothing was skipped in the text.

3. Text Adjustment

A. Text is compatible with assistive technology.	**Pass**
Additional Information:	**Evaluated Chapter 2. All of chapter 2 was compatible with the zoom feature, you were able to zoom up to 200% in full screen without any horizontal scrolling. All text zoomed in and out in Chapter 2 without any problem.**
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Fail**
Additional Information:	**Evaluated Chapter 2. There are times when the background of the notes sections in chapter stay white in night mode while the font changes color. The contrast is not good because it islight gray text on a white background, then there are times when the background changes color along with the text and the contrast is good with white text on dark gray background. There are also times when figures do not show up in night mode even when you refresh the page. The only way that the figures show up is when you disable night mode, then refresh, then enable night mode again.**

4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Pass**

Additional Information:	**All 30 webpages that were evaluated had text that reflowed properly into the next line without having to horizontally scroll through the page.**
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	**N/A**
Additional Information:	**Did not find a PDF format of the textbook.**

5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.	**Pass**
Additional Information:	**Sections 1.2, 2.3, 3.5, 4.2, 5.1 - Normal text is read in order without any text being skipped, however there were STEM equations that were skipped throughout Section 1.2, and there are also parts of STEM equations (symbols such as arrows, subtraction, division, and multiplication signs) that are skipped while read aloud.**

6. Structural Markup/Navigation

A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Pass**
Additional Information:	**10 of the headings that I evaluated (All of section 1.1 and Section 1.2 & 1.2.1) all worked with the NVDA reader assistive technology. I was able to navigate through all of the headings in these sections with no problem.**
B. The text of the digital resource includes markup for bullets and numbered lists that is	**Pass**

compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	
Additional Information:	**10 of the list keys that I evaluated (1.1, 1.2.2, 1.3.2, 2.1.1, 2.2.1, 2.2.3, 3.3.2, 3.3.4, 4.3.2, 5.1.1) all worked with the NVDA reader assistive technology. I was able to navigate through all of the lists in these sections with no problem.**
C. If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	**N/A**
Additional Information:	

7. Tables

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**7/8 tables that I evaluated did not work. These tables were not marked as tables, they were marked as figures within the book instead. When evaluating the table markup with the NVDA reader, the reader could not read most of the tables except one properly. The only table that was read by columns and rows separately was in Ch. 5.4.4 in Ex. 5.27. This table was not marked but the rows and columns were read properly and the keys were able to identify each column and row. The other figures that were actually tables and were not read column by column or row by row were in Chapters 1.1.7, 2.2.3, 2.2.4, 2.4.3, 3.5.3, 5.3.2, and 5.5.1.**

8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	
Additional Information:	
B. Live hyperlinks take you to any website or webpages external to the book.	**Pass**
Additional Information:	**20/20 hyperlinks that I evaluated worked. These were all links that lead to different parts of the book and they lead to places that were expected.**
C. Live links take you to the correct webpage that is functioning properly.	**Pass**
Additional Information:	**20/20 hyperlinks that I evaluated worked. These were all links that lead to different parts of the book and they lead to places that were expected. There were no links that lead to other websites.**
D. Live links are descriptive enough for the users to know where it should take them.	**Pass**
Additional Information:	**20/20 hyperlinks that I evaluated were described properly. There were no links that were just the URL to the expected location. All of the links had titles that described where they would go within the HTML textbook.**

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	**Pass**
Additional Information:	**Chapter 1 was evaluated and all of chapter 1 had consistent colored headings and links.**

B. Information is conveyed from the sub-categories for contrast.	**Pass**
Additional Information:	**Chapter 1 was evaluated and all of chapter 1 had proper contrast ratios for regular texts and large texts.**
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	**Pass**
Additional Information:	**Chapter 1 was evaluated and all of chapter 1 had headings with proper contrast ratios with blue color for the text and white for the background.**
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	**Pass**
Additional Information:	**Chapter 1 was evaluated and all of chapter 1 had text that had proper contrast ratios with black as the color for the text and white as the background.**
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	**Pass**
Additional Information:	**Chapter 2 was evaluated and all of chapter 2's simple images had proper contrast ratios because they were in black and white.**

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	**Fail**
Additional Information:	**Language markup not written in source code.**
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	**N/A**
Additional Information:	

11.Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**7/8 of the non-decorative images were not described in detail while the NVDA reader was reading the textbook aloud. The NVDA reader read these images as if they were tables, which was not helpful in describing what was in the images. The NVDA did read the captions of each of the images but the captions were not enough information to describe the images. The only image in chapter 2 that had adequate information to describe the non-decorative image was Fig. 2.15. The rest of the images that were evaluated but did not have information to describe what was in the image were Figures 2.25, 2.26, 2.1, 2.2, 2.6, 2.7, 2.16, and 2.17.**
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	**Pass**
Additional Information:	**The only decorative image in the book was in the title page and the title page image was skipped by the NVDA reader while reading the textbook.**
C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Fail**
Additional Information:	**0/10 of the complex images were not described in detail while the NVDA reader was reading the textbook aloud. The NVDA reader read these images as if they were tables, which was not helpful in describing what was in the images. The NVDA did read the captions of each of the images but the captions were not enough information to describe the images.The images that were evaluated but did**

	not have information to describe what was in the image were Figures2.8, 2.9, 2.10, 2.11, 2.12, 2.14, 2.18, 2.19, 2.23, and 2.24.

12.Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	N/A
Additional Information:	
B. A transcript is provided with all audio content.	N/A
Additional Information:	
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	N/A
Additional Information:	

13.Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	Pass
Additional Information:	No flickering content

14.Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	Pass
Additional Information:	10 of the figures that were evaluated throughout the textbook were marked properly as figures. The figures that were evaluated were Figures 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, and 2.5.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Fail

Additional Information:	**The only graph that was found was Figure 2.20, however this graph was not marked properly as a graph. In the textbook, it was labeled as a figure.**
C. STEM equations have appropriate markup that indicates that the image is an equation.	**Pass**
Additional Information:	**0/10 of the equations that were evaluated were not read properly as STEM equations in the textbook. Parts of the equations were skipped and other parts were not read properly as mathematical equations. The equations that were evaluated were located in Chapters 1.1, 1.1.4, 1.1.6, 1.1.7, 2.1.1, 2.3.2, 1.8, 1.2.1, and 1.2.2.**
D. STEM tables have appropriate markup that indicates the image is a table.	**Fail**
Additional Information:	**0/10 of the tables that were evaluated were marked up properly. The tables that were evaluated were in chapters 1.17, 2.2.3, 2.2.4, 2.4.3, 3.5.3, 5.3.1, 5.4.4, and 5.5.1. These tables were marked up as Figures even tough they were actually tables.**
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Pass**
Additional Information:	**10 of the figures that were evaluated throughout the textbook were described by the captions that were beneath each figure. However, these figures were read as a table in though they were diagrams or pictures of people, etc. They should have been described in more detail other than the captions that were beneath, however, the captions did describe what each figure had with little information. The figures that were evaluated included Figures 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, and 2.5.**
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**

Additional Information:	The only graph that was found (Figure 2.20) was not described in detail. The caption only read the title of the graph. The NVDA reader did not describe how the lines on the graph look, the axes, or the scales of the line graph. There was not information to describe what was in the graph.
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:	**0/10 of the equations that were evaluated were read properly. There were parts of the equations that were skipped such as subtraction and multiplication symbols, whole equations were skipped, greater than or less than symbols were skipped, and specfic number patterns were skipped as well. There were also STEM equations that were not read properly, x "squared" and y "squared" was read as X2 and Y2, sqrt was read as individual letters rather than "squareroot," division symbols were read as "slash," and fibonnacci equations and numbers were skipped. These equations were located in chapters 1.1, 1.1.4, 1.1.6, 1.1.7, 2.1.1, 2.3.2, 1.8, 1.2.1, and 1.2.2.**
H. Assistive technology used can access the content from the STEM tables.	**Fail**
Additional Information:	**None of the tables that were evaluated were described as tables. They were all read as figures. The tables were not read column by column or row by row. These tables were located in chapters 1.17, 2.2.3, 2.2.4, 2.4.3, 3.5.3, 5.3.1, 5.4.4, and 5.5.1.**

15. Interactive Elements

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	**N/A**
Additional Information:	

B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	N/A
Additional Information:	
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	N/A
Additional Information:	

DETAILED ACCESSIBILITY EVALUATION REPORT using Non-Assistive Technologies

Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.

1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	Fail
Additional Information:	Not Included
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	Not Included
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	Not Included

2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	**Pass**
Additional Information:	**Text was converted to speech without a problem pages: 1-10.**

3. Text Adjustment

A. Text is compatible with assistive technology.	**Pass**
Additional Information:	**Text was allowed to increase and decrease witht the use of percentages, pages 10-20.**
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Pass**
Additional Information:	**Colors can be changed but font styles are restricted.**

4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Pass**
Additional Information:	**Pages: 1-10**
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	**N/A**
Additional Information:	

5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of	**Pass**

the page when rendered by assistive technology.	
Additional Information:	**The text is organized logically pages: 1-10.**

6. *Structural Markup/Navigation*

A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**
Additional Information:	**AT NEEDED**
B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**
Additional Information:	**AT NEEDED**
C. If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	**N/A**
Additional Information:	**AT NEEDED**

7. *Tables*

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**

Additional Information:	

8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	**N/A**
Additional Information:	
B. Live hyperlinks take you to any website or webpages external to the book.	**Pass**
Additional Information:	**All hyperlinks found were shortcuts for the book chapters and figures.**
C. Live links take you to the correct webpage that is functioning properly.	**Pass**
Additional Information:	**Chapters 3-5**
D. Live links are descriptive enough for the users to know where it should take them.	**Pass**
Additional Information:	**Chapter links are descriptive, no other links found.**

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	**Pass**
Additional Information:	**Headings are emphasized using bold, italicized, or underlines.**
B. Information is conveyed from the sub-categories for contrast.	**Pass**
Additional Information:	**Ratio: 9.35:1**
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	**N/A**

Additional Information:	
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	**N/A**
Additional Information:	
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	**N/A**
Additional Information:	

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	**Fail**
Additional Information:	**Does not specify language in code.**
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	**Fail**
Additional Information:	**Latin is not specified when used.**

11.Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**
Additional Information:	
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	**N/A**
Additional Information:	

C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Fail**
Additional Information:	**These images are not descriptive through the use of alt, Cahpter 5.4, 2.2.4**

12. Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	**N/A**
Additional Information:	
B. A transcript is provided with all audio content.	**N/A**
Additional Information:	
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	**N/A**
Additional Information:	

13. Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	**Pass**
Additional Information:	

14. Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	**Fail**
Additional Information:	**These items were not labeled or described appropriately. There are many figures and equations in this book, Chapter 1.**

B. STEM graphs have appropriate markup that indicates that the image is a graph.	**N/A**
Additional Information:	
C. STEM equations have appropriate markup that indicates that the image is an equation.	**Fail**
Additional Information:	**These items were not labeled or described appropriately. There are many figures and equations in this book. Chapter 1.**
D. STEM tables have appropriate markup that indicates the image is a table.	**N/A**
Additional Information:	
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:	**These items were not labeled or described appropriately. There are many figures and equations in this book.**
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**N/A**
Additional Information:	
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:	**These items were not labeled or described appropriately. There are many figures and equations in this book. Chapter 1.**
H. Assistive technology used can access the content from the STEM tables.	**N/A**
Additional Information:	

15. Interactive Elements

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	**N/A**
Additional Information:	
B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	**N/A**
Additional Information:	
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**
Additional Information:	

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