



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: The Environment and the Earth’s Surface
Format of Textbook: PDF

Assistive Technology (AT) Evaluation Score: Overall	6.3 (Maximum score = 10)
<p>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.</p> <ul style="list-style-type: none"> • 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	7.9 (Maximum score =10)
<p>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.</p>	



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:	No accessibility documentation was found.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	No accessibility documentation was found.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	No accessibility documentation was found.

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.	
Additional Information:	5/5. Pages 1-5 of Chapter 1 were evaluated. The text allows to TTS compatibility.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	5/5. Pages 1-5 of Chapter 1 were evaluated. The text allows the user to adjust the font.
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,	Pass



media player, or reader) that offers this functionality).	
Additional Information:	5/5. Pages 11-15 of Chapter 1 were evaluated. The text allows for adjustment of font and colors.

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:	5/5. Pages 1-5 of Chapter 1 were evaluated. The text allows the user to reflow the text.
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	N/A
Additional Information:	N/A. This checkpoint could not be evaluated as no printed material was available.

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:	5/5. Pages 1-5 of Chapter 1 were evaluated. The content rendered by the AT is compatible with the visual layout of the text.

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	Fail
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such as a browser, media player, or reader that offers this functionality).	
Additional Information:	0/20. Pages 1-20 of Chapter 1 were evaluated. The text does not allow for navigation by key structural markups.
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:	This checkpoint cannot be evaluated as no lists were found in the text.
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:	This checkpoint cannot be evaluated as no e-reader application is used with this text.

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:	0/5. Five tables were evaluated (Pages 13 and 14 of Chapter 1, Page 65 of Chapter 2, Page 4 of Chapter 6, Page 3 of Chapter 12). All tables do NOT include markup that is compatible with AT.



8. Hyperlinks

<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>N/A. No in-book or live hyperlinks were found throughout the entire text.</p>
<p>B. Live hyperlinks take you to any website or webpages external to the book.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>N/A. No in-book or live hyperlinks were found throughout the entire text.</p>
<p>C. Live links take you to the correct webpage that is functioning properly.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>N/A. No in-book or live hyperlinks were found throughout the entire text.</p>
<p>D. Live links are descriptive enough for the users to know where it should take them.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>N/A. No in-book or live hyperlinks were found throughout the entire text.</p>

9. Color and Contrast

<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Pages 1-67 were evaluated. The text does not utilize color to highlight key information.</p>
<p>B. Information is conveyed from the sub-categories for contrast.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pages 1-10 were evaluated. The entirety of the text is black (#030000) on a white background (#FFFFFF). The entire text has sufficient contrast for both headers and text.</p>



C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Pages 1-10 were evaluated. The entirety of the text is black (#030000) on a white background (FFFFFF). The entire text has sufficient contrast for both headers and text.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Pages 1-10 were evaluated. The entirety of the text is black (#030000) on a white background (FFFFFF). The entire text has sufficient contrast for both headers and text.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass
Additional Information:	Pages 1-10 were evaluated. The entirety of the text is black (#030000) on a white background (FFFFFF). The entire text has sufficient contrast for both headers and text.

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.	Pass
Additional Information:	A primary language is identified for all chapters.
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:	Pages 1-71 were evaluated. No passages in a language other than English were found in the text.



11.Images

<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/54. Pages 1-70 were evaluated. No images were found to be compatible with assistive technology.</p>
<p>B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>N/A. The text does not include decorative images.</p>
<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/54. Pages 1-70 were evaluated. No images were found to be compatible with assistive technology.</p>

12.Multimedia

<p>A. A synchronized text track (e.g. open or closed captions) is provided with all video content.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Pages 1-71 were evaluated. No multimedia was found in the text.</p>
<p>B. A transcript is provided with all audio content.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Pages 1-71 were evaluated. No multimedia was found in the text.</p>
<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Pages 1-71 were evaluated. No multimedia was found in the text.</p>



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:	Pages 1-71 were evaluated. No flickering was found in the text.

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

A. STEM figures have appropriate markup that indicates that the image is a figure.	Fail
Additional Information:	0/54. Pages 1-70 of Chapter 1 were evaluated. No figures were found to compatible with AT.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Fail
Additional Information:	0/10. Ten graphs in Chapter 7 were evaluated (pages 6, 8, 9, 10 - two graphs, 13, 17, 22 - two graphs, and 30 of Chapter 7). All graphs were not found to have markup compatible with AT.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	0/10. Pages 1-46 of Chapter 8 were evaluated. All ten equations were not found to have compatible markup with AT.
D. STEM tables have appropriate markup that indicates the image is a table.	Fail
Additional Information:	0/5. Five tables were evaluated (Pages 13 and 14 of Chapter 1, Page 65 of Chapter 2, Page 4 of Chapter 6, Page 3 of Chapter 12). All tables do NOT include markup that is compatible with AT.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail



Additional Information:	0/54. Pages 1-70 of Chapter 1 were evaluated. No figures were found to have suitable notation markup.
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail
Additional Information:	0/10. Ten graphs in Chapter 7 were evaluated (pages 6, 8, 9, 10 - two graphs, 13, 17, 22 - two graphs, and 30 of Chapter 7). All graphs were not found to have suitable notation markup.
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. Pages 1-46 of Chapter 8 were evaluated. All ten equations were not found to have appropriate notation markup.
H. Assistive technology used can access the content from the STEM tables.	Fail
Additional Information:	0/5. Five tables were evaluated (Pages 13 and 14 of Chapter 1, Page 65 of Chapter 2, Page 4 of Chapter 6, Page 3 of Chapter 12). All tables do NOT include suitable notation markup.

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:	Pages 1-71 were evaluated. No interactive elements were found in the text.
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:	Pages 1-71 were evaluated. No interactive elements were found in the text.
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:	Pages 1-71 were evaluated. No interactive elements were found in the text.

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:	No Content Found
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	No Content Found
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	No Content Found



2. Text Access

<p>A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 1-5 were checked. The text is available to assistive technology that allows user to enable text-to-speech functionality.</p>

3. Text Adjustment

<p>A. Text is compatible with assistive technology.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 1-5 were checked. When the window page chaged in size, no horizontal bar appeared. The font size could be adjusted.</p>
<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>Pgs 1-5 were checked. When changing the font/background color to green text on black, the background color did change to black and the font color did change to green.</p>

4. Reading Layout

<p>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).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 5-10 were checked. When reflowing the text, the text was accessible to text-to-speech functions.</p>
<p>B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.</p>	<p>N/A</p>



Additional Information:	Need additional information. We do not have printed material to compare it too.
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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.	Fail
Additional Information:	Pgs 2-7 were checked. The reading order was not logical. The text-to-speech function skipped over images and went back to the images after reading the text that was part of the content.

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).	Fail
Additional Information:	No navigational text found. The title, bookmarks all failed using the accessibility checker. Heading and Tagged PDF passed.
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).	Fail
Additional Information:	There were no list structural markups. The Title and Bookmarks all failed using the accessibility checker. Headings and Tagged PDF passed.
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	Fail



reader interface and move directly to the text content that is compatible with assistive technology.	
Additional Information:	There was none found. The Title and Bookmarks all failed using the accessibility checker. Headings and Tagged PDF passed.

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:	There were two tables found throughout the chapter. Tables on page 13 and 17 were under Figure markups. The markups were not descriptive enough to convey meaning. Using the accessibility checker, the rows TH and TD, headers and regularity all passed.

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:	No within book links within the book.
B. Live hyperlinks take you to any website or webpages external to the book.	N/A
Additional Information:	No live hyperlinks found within the book.
C. Live links take you to the correct webpage that is functioning properly.	N/A
Additional Information:	No live hyperlinks found within the book.



D. Live links are descriptive enough for the users to know where it should take them.	N/A
Additional Information:	No live hyperlinks found within the book.

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:	Pgs 1-4 were checked. Information not conveyed by color alone. Size of font was used to convey information as well as the style (bold vs non-bold text, italics vs print). The chapter titles larger is size compared to the rest of the text.
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	Pgs 1-4 were checked. Most pages had the contrast ratio of 4.51:1 and above (20.17:1). The chapter titles were larger in size compared to the rest of the text. The chapter titles passed with 21.0:1. There was text in italics which passed with a ratio of 21.01:1.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Pgs 1-4 were checked. Large chapter headings passed with a ratio of 21.0:1.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Pgs 1-4 were checked. Most of the text was above the ratio 4.51:1 (20.17:1). Large text, which in this case were chapter titles, passed with a 21.0:1. Text in italics passed with a ratio of 21.0:1.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass



Additional Information:	Pgs 7-11 were checked. Simple images passed with a ratio of 4.51:1 and above (Example: On page 7, the simple image passed with a ratio of 11.37:1).
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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.	Pass
Additional Information:	Using the accessibility checker the primary language passed.
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.	Pass
Additional Information:	Using the accessibility checker the primary language passed.

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:	9/10 non-decorative images included alternative text. Images were found on pages 2, 3, 7, 9, 10, 11, 15, 21, 23, and 26. Image on page 7 did not include alternative text that was compatible with assistive technology. Figures alternative text failed.
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:	No Decorative images found. Figures alternative text failed.



<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>2/10 complex images had descriptive alternative text. Images were found on pages 13, 17, 18, 19, 20 (2 images), 24, 336, 43, and 45. Pages 19 and 36 had complex images that had descriptive alternative text to convey information. Figures alternative text failed.</p>

12. Multimedia

<p>A. A synchronized text track (e.g. open or closed captions) is provided with all video content.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No content found.</p>
<p>B. A transcript is provided with all audio content.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No content found.</p>
<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No content found.</p>

13. Flickering

<p>A. The digital resource content does not contain anything that flashes more than three times in any one-second period.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 1-10 were checked. No flickering content was observed. Using the accessibility checker, screen flicker passed.</p>



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

A. STEM figures have appropriate markup that indicates that the image is a figure.	Pass
Additional Information:	10/10 figures markups are compatible with assistive technology and were sufficient to convey meaning. Figures were found on pages 2, 3, 7, 9, 10, 11, 15, 21, 23, and 26.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	N/A
Additional Information:	STEM graphs were under mark ups for figures. They were identified as figures.
C. STEM equations have appropriate markup that indicates that the image is an equation.	N/A
Additional Information:	STEM equations were under mark ups for figures. They were identified as figures.
D. STEM tables have appropriate markup that indicates the image is a table.	N/A
Additional Information:	STEM tables were under mark ups for figures. They were identified as figures.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail
Additional Information:	9/10 figures notation markups are compatible with assistive technology and were sufficient to convey meaning. Figures were found on pages 2, 3, 7, 9, 10, 11, 15, 21, 23, and 26. Figure on page 7 had a notation markup that did not convey meaning.
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	N/A
Additional Information:	STEM graphs were under mark ups for figures. They were identified as figures.
G. STEM equations have appropriate notation markup that conveys both the notation	N/A



(presentation) and meaning (semantics) of the STEM content.	
Additional Information:	STEM equations were under mark ups for figures. They were identified as figures.
H. Assistive technology used can access the content from the STEM tables.	N/A
Additional Information:	STEM tables were under mark ups for figures. They were identified as figures.

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:	No Interactive Element Present.
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:	No Interactive Element Present.
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:	No Interactive Element Present.

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