



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: Campbell Biology
Format of Textbook: PDF

Assistive Technology (AT) Evaluation Score: Overall	5.7 (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	6.8 (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:	Could not find this information.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	Could not find this information.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	Could not find this information.

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:	NVDA read all the text on pages 4-8. However, the pace was very fast and NVDA always reads the page footer which disrupts the flow of reading.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	Used Adobe Reader XI and the text size was adjustable on pages 4-8.
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,	Fail



media player, or reader) that offers this functionality).	
Additional Information:	Used Adobe Reader XI to adjust the font and background colors. The colors were not adjustable on pages 4-8. The background color only changes on some pages and the text color never changes.

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).	Fail
Additional Information:	Used Adobe Reader XI and the text did not reflow on pages 4-8.
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	N/A
Additional Information:	No printed version.

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:	Used NVDA and checked the digital resource layout on pages 4, 6, 9, 10, and 11. The reading order logically corresponds to the page layout.

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	Fail
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technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	
Additional Information:	Used NVDA and checked pages 4-12. No headings were found. "No next heading."
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:	Used NVDA and checked lists on pages 4, 12, 14, 19, 22, 28, 32, 34, 35, and 42. No lists were found. "No next list."
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:	Not using reader application.

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:	Used NVDA to check table markup. 2/2 tables were detected. Wrong number of rows and columns detected. Checked tables on pages 23 and 33. No other tables found.



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 in book links found.
B. Live hyperlinks take you to any website or webpages external to the book.	N/A
Additional Information:	No live links found.
C. Live links take you to the correct webpage that is functioning properly.	N/A
Additional Information:	No live links found.
D. Live links are descriptive enough for the users to know where it should take them.	N/A
Additional Information:	No live 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.	N/A
Additional Information:	No color use found.
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers, text, and simple images. All headers pass the color contrast requirements. Blue text for key concepts and figures does not pass. No simple images found. Checked pages 4-11.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass



Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers and all headers pass the color contrast requirements. Checked pages 4-11.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check the text on pages 4-11. Blue text for key concepts and figures does not pass.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	N/A
Additional Information:	No simple images found.

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.	N/A
Additional Information:	Cannot check this because do not have Adobe Acrobat Pro.
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:	Cannot check this because do not have Adobe Acrobat Pro.

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
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Additional Information:	NVDA did not detect non-decorative images, there was no alternative text and the descriptions were not descriptive enough. Checked pages 4-20.
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.
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:	NVDA did not detect complex images, there was no alternative text and the descriptions were not descriptive enough. Checked pages 4-20.

12.Multimedia

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

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 found.



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 had labels. Checked figures on pages 4, 5, 7, 8, 9, 10, 11, 13, 14, and 16.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Pass
Additional Information:	5/6 graphs had labels. Checked graphs on pages 57, 62, 63, 66, 71, and 101. No other graphs found.
C. STEM equations have appropriate markup that indicates that the image is an equation.	N/A
Additional Information:	No equations found.
D. STEM tables have appropriate markup that indicates the image is a table.	Pass
Additional Information:	2/2 tables had labels. Checked tables on pages 23 and 33. No other tables found.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail
Additional Information:	0/10 figures had acceptable descriptions and the reader skips over the images. Checked figures on pages 4, 5, 7, 8, 9, 10, 11, 13, 14, and 16.
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	N/A
Additional Information:	No graphs found.
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	N/A
Additional Information:	No equations found.



H. Assistive technology used can access the content from the STEM tables.	Fail
Additional Information:	2/2 tables were detected. Wrong number of rows and columns detected. Checked tables on pages 23 and 33. No other tables found.

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 elements found.
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 elements found.
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 elements found.



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

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:	Pgs 3-8 were checked. The text is available to assistive technology that allows user to enable text-to-speech functionality.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	Pgs 3-8 were checked. When the window page chaged in size, no horizontal bar appeared. The font size of all pages checked could be adjusted.
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,	Fail



media player, or reader) that offers this functionality).	
Additional Information:	Pgs 1-5 were checked. When changing the font/background color to green text on black, the background color changed to black, and the font color however changed to the color grey. The text did not change to green. Some pages like page 2 did not change in color at all. The background color did not change to black and the text did not change as well.

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).	Fail
Additional Information:	Pgs 5-10 were checked. I was able to reflow the text, however, when reflowing the text, the text to speech function said "warning empty page". In addition, the text ended up changing in format. Meaning there was no space between words when the window was resized.
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	N/A
Additional Information:	Need additional information. We do not have printed material to compare it too.

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:	Pgs 5-10 were checked. The reading order was logical on all five pages.



6. Structural Markup/Navigation

<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>Bookmark was found that allowed me to go to a specific chapter. The tagged PDF, Title, and Headings all failed using the accessibility checker. However, the boomarks passed.</p>
<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>There were no list structural markups. The tagged PDF, Title, and Headings all failed using the accessibility checker. However, boomarks passed.</p>
<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No additional eReader used</p>

7. Tables

<p>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</p>	<p>Fail</p>
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such as a browser, media player, or reader that offers this functionality).	
Additional Information:	Tables on pages 22, and 32 were checked manually. There were only two tables throughout the entire book. The text to speech function seperated and read the tables by row. Using the accessibilkity checker, the rows, TH and TD, headers and regularity all failed.

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 hyperlinks found. However, the accessibility checker resulted in navigation links passed.
B. Live hyperlinks take you to any website or webpages external to the book.	Pass
Additional Information:	10/10 live links worked. Only 10 live links were found throughout the entire book. Pgs 1-157 were checked. Live links in pages 48, 50, 71, 77, 92, 97, 114, 136, 142, 154 functioned.
C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	10/10 live links worked. Pgs 1-157 were checked. All live links functioned.
D. Live links are descriptive enough for the users to know where it should take them.	Fail
Additional Information:	0/10 live links had a description. Pgs 1-157 were checked. 20 out of the 20 links were in html (URL) form and were not descriptive enough.



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>Pass</p>
<p>Additional Information:</p>	<p>Pgs 3-11 were checked. Information not conveyed by color alone. Size of font, and type of font (Bold versus Non-Bold font) were used. There were chapter headers that were large in text. The number for the chapter was larger than all the text on a page, and it was in white with yellow background. The chapter titles were in black and bold. The subsection headings were in blue font, bold font, and the size was larger than the rest of the text but smaller in comparison to the chapter heading/title. This happened throughout the book. There were also headings in burgandy color and smaller in size.</p>
<p>B. Information is conveyed from the sub-categories for contrast.</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>Pgs 3-11 were checked. Most pages had the contrast ratio of 4.51:1 and above (13.66:1). Chapter numbers where in white with a a gold background color; the ratio was 1.7:1 which failed. The chapter title was in black with gold background color; The ratio was 9.58:1 which passed. The blue subsection headings had a ratio of 5.86:1 which passed. Headings in red passed with a ratio of 9.02:1.</p>
<p>C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 3-11 were checked. Large chapter headings passed with a ratio of 9.58:1.</p>
<p>D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Pgs 3-11 were checked. Most of the text was above the ratio 4.51:1 (13.66:1). Large text (chapter headings) had a ratio of 9.58:1.</p>



E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass
Additional Information:	Pgs 4-12 were checked. Simple images passed with a ratio of 4.51:1 and above (EX: 13.48:1 ratio for image on page 4).

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:	Using the accessibility checker the primary language failed.
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:	Using the accessibility checker the primary language failed.

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:	10/10 images did include descriptions. Pgs 4, 5, 6, 7, 8 (2 images), 9, 12 (2 images), and 13 all had images and were checked manually. Overall images did include descriptions. ---> Using the accessibility checker, figures alternate text failed.



<p>A. 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>5/5 decorative images included descriptions but not markups. Pgs 2, 3, 51, 115, and 137 all had images and were checked manually. There were only 5 decorative images found throughout the entire book. Overall images included descriptions, however, they did not contain markups that allowed them to be ignored by assistive technology.</p>
<p>B. 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>10/10 image descriptions did convey meaning (descriptions were present for images). Pgs 22, 32, 116, 117 (2 images), 120, 121, 133, 134, and 141 had images and were checked. All images did contain descriptions. --->Using the accessibility checker, figures alternate 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

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

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 figure markups did not convey meaning. Pgs 4, 5, 6, 7, 8 (2 images), 9, 12, 12, and 13 all had images and were checked. Overall the (labels/tags) did convey meaning.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	N/A
Additional Information:	No Graphs Found throughout the book.
C. STEM equations have appropriate markup that indicates that the image is an equation.	N/A
Additional Information:	No Equations found throughout the book.
D. STEM tables have appropriate markup that indicates the image is a table.	Pass
Additional Information:	2/2 table markups did provide enough information to convey meaning. Pgs 22, and 33 all had tables and were checked. There were only 2 tables found throughout the book. Overall markups did convey meaning.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Pass
Additional Information:	10/10 notation markups were sufficient to convey meaning. There were not descriptions of the figures. Pgs 4, 5, 6, 7, 8 (2 images), 9, 12 (2 images), 13 all had



	figures and were checked. The notation markups were sufficient enough to convey presentation.
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	N/A
Additional Information:	No Graphs Found throughout the book.
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	N/A
Additional Information:	No equations found throughout the book.
H. Assistive technology used can access the content from the STEM tables.	Pass
Additional Information:	0/2 notation markups provided good descriptions sufficient enough to convey meaning. Pgs 22 and 32 all had tables and were checked. There was a total of 2 tables throughout the books. Notation markups were sufficient enough to convey presentation.

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 Elements 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 Elements Present.
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered	N/A



by an application such as a browser, media player, or reader that offers this functionality).	
Additional Information:	No Interactive Elements Present.

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